CONVERGENCE

COMPETITION
AND
COOPERATION

Policy and Regulation Affecting Local Telephone and Cable Networks

Report of the Co-chairs of the
Local Networks Convergence Committee

Canada

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September 1992

The Honourable Perrin Beatty
Minister of Communications
Ottawa

Dear Mr. Beatty:

We are pleased to provide the following report and recommendations regarding the policy and regulatory framework for local telephone and cable television networks.

This report is the culmination of the work of the Local Networks Convergence Committee, whose members reflected a wide range of interests in the future of the local network infrastructure. The members of the Committee were:

Michael Allen	Rogers Communications Inc.
David Basskin	Canadian Musical Reproduction Rights Agency Ltd.
Brian Chater	Canadian Independent Record Production Association
Gordon Craig	The Sports Network
Robert Duchesne	Québec-Téléphone
John Farrell	Telecom Canada (Stentor Canadian Network Management)
Steven Globerman	Simon Fraser University
Gary Kain	Regional Cablesystems Inc.
Mairi MacDonald	Canadian Business Telecommunications Alliance
Blair MacKenzie	Canadian Daily Newspaper Publishers Association
Owen McAleer	Bell Canada
Michael McCabe	Canadian Association of Broadcasters
Peter Mortimer	Canadian Film and Television Production Association
Robert Parenteau	Canadian Independent Telephone Association
Mario Pittarelli	Vidéotron Ltée
Fred Pomeroy	Communications and Electrical Workers of Canada
James Pratt	AGT Limited
Pierre Simon	Le Câble de Rivière-du-Loup Ltée
Ken Stein	Canadian Cable Television Association
Richard Stursberg	Unitel Communications Inc.
Israel Switzer	consulting engineer

As co-chairs of the Committee, we were privileged to be able to consult its members and to rely on their extensive experience and thoughtful perspectives. In accordance with your mandate, however, it was the task of the co-chairs to prepare this report and its recommendations.

Yours truly,

Hank Intven

Robert J. Ménard

ACKNOWLEDGMENTS

Our task as co-chairs of the Local Networks Convergence Committee was neither simple nor uncontroversial. No one presented us with a guidebook on how to develop recommendations for Canadian government policy and regulation to govern the Canadian local telecommunications network infrastructure in the latter part of the 20th century.

However, with the help of some of the most experienced observers of the development of the local telecommunications infrastructure, we have crafted a set of recommendations that we think will provide Canada with a sound policy and regulatory framework.

We are particularly grateful to the members of the Local Networks Convergence Committee for their participation in our daunting task. Not only did members present detailed analyses and persuasive arguments in support of the interests of the organizations and industries with which they were affiliated, most also provided useful perspectives on how the interests of Canadian consumers, and the Canadian public generally, would best be served.

We also received written submissions from, met with and otherwise obtained input from a wide variety of Canadians and others who are interested in the future of the local network infrastructure. We appreciate the time and energy expended by the many people who assisted us in understanding and dealing with the issues we addressed.

Thanks are also due to Tom Hughes, the Executive Secretary of the Committee, to Maria De Rosa and to Wendy Kerr, each of whom assisted us throughout the various stages of this project.

We would also like to acknowledge the efforts and insights of a few people who made a particularly significant contribution to the completion of the report: Larry Durr, Tom Grandy, Ian Ironside, Joanne Lemay and Mairi MacDonald.

Finally, we would like to thank our partners and colleagues at McCarthy Tétrault and DTI Télécom Inc. who supported us throughout this endeavour and graciously accepted the time it took us away from our other responsibilities.

HGI & RJM

EXECUTIVE SUMMARY

This report is the culmination of the work of the Local Networks Convergence Committee. It includes the recommendations of the Committee's co-chairs for changes in government policy and regulation affecting the future evolution of the local telecommunications network infrastructure. The report and its recommendations take into account technological and economic developments that will lead to increasing convergence of the services and markets of telephone companies and cable operators.

The report recommends a flexible policy and regulatory framework which relies on an increasingly competitive market place to develop an advanced cable and telephone infrastructure. The local network infrastructure foreseen in the report will have the following characteristics:

- Greater interconnection between networks to permit the introduction of more efficient and advanced services.
- Cooperative ventures for the shared use of various elements of the local network infrastructure where this will provide more efficient or advanced services than a telephone or cable network could offer by itself, and particularly in small and remote service areas. Such ventures, however, should be freely entered into by network operators for sound economic or technical reasons, and not solely as a result of a merger, takeover, or common corporate ownership of different operators.
- A flexible regulatory and policy environment which permits firms to increase their efficiency, capabilities and competitiveness through joint infrastructure ventures with other industry players, including competitors.
- Regulatory safeguards to maintain fair and effective competition between the telephone and cable industries.
- Regulatory supervision to ensure that the local network infrastructure evolves in a manner that is conducive to the achievement of the objectives of the *Broadcasting Act*.

Local Network Efficiency

An efficient local network infrastructure will be essential to Canada's success in the global information economy. There is no clear evidence that, in the Canadian environment, it would be more efficient to provide telephone and cable services jointly over a single local network infrastructure. On the contrary, it would be more efficient to continue to have the two existing networks deliver the core cable and telephone services, namely television program distribution and narrowband interactive voice, data and image telecommunications. Moreover, increasing telephone/cable competition in some service areas will stimulate the introduction of innovative and more efficient new services. Accordingly, government policy and regulation should continue to support a competitive local network environment and not promote the full integration of local network infrastructures.

However, government policy and regulation should not prevent the sharing and integration of different *elements* of the local cable and telephone infrastructure, as and when the technology and market place develop so that such arrangements are more efficient than the use of separate facilities. Examples of existing shared network elements include support structures such as utility poles, conduits and rights-of-way. In the future, shared network elements are likely to include commonly owned or "condominium" fibre cables and other transmission facilities. It should be possible for competitive telecommunications network operators to share some infrastructure facilities without compromising a competitive market place, just as it is for airlines to share airports or reservations systems and railways to share tracks.

Regulatory supervision will be required to ensure that neither cable operators nor telephone companies refuse to cooperate in the implementation of approaches to network integration and interconnection that would improve the efficiency of the local network infrastructure.

Ownership of the Local Network Infrastructure

Canadian policy and regulation should continue to promote the sharing of support structures by telephone companies, cable operators and other support structure providers.

Cable operators should have the same legal rights of access to public rights-of-way as federally regulated telephone companies, where support structures are not available to them on reasonable conditions from telephone companies or others.

CRTC rules should be changed in order to permit cable operators to use subscriber access lines (drops) that are partly or wholly owned by others, including telephone companies. Such arrangements should be subject to safeguards to retain a competitive local infrastructure and to ensure that the objectives of the *Broadcasting Act* are not frustrated. Specific safeguards are recommended, relating to regulatory supervision, benefits to consumers, quality of service, a prohibition against restrictions on cable operators' use of drops leased from others, and the right of cable operators to terminate leases of subscriber drops. No cable operators should be forced, directly or indirectly, to lease drops from other providers.

The requirement that a cable operator must own its amplifiers should also be abolished. On the other hand, cable head end facilities should continue to be owned and directly controlled by cable operators. However, cable operators should share head end facilities among each other where it is more cost-effective than separate head ends or where such sharing would enable cable operators to provide a wider range of services.

Current CRTC rules that prevent telephone companies from leasing back capacity on transmission lines they lease to cable operators should be abolished, but telephone companies should not impose restrictions on cable operators' use of such leased facilities.

Cable operators and telephone companies serving less densely populated areas, should, in consultation with their employees and their unions, pursue opportunities for increased efficiency through shared or integrated administration, maintenance and similar functions related to the ongoing operation of their networks.

Developing Advanced Local Broadband Networks

Government policy and regulation should:

- permit the timely and cost-effective upgrading of the cable network infrastructure in order to maintain the cable industry's competitive position vis-à-vis alternate means of television program distribution such as U.S.-based Direct Broadcast Satellites;
- permit the upgrading of the telephone network infrastructure to enable it to provide Canadian business, government, educational and residential consumers with advanced telecommunications services that are competitive with those available in other industrialized countries;
- permit the telephone and cable industries to cooperate, share and integrate their facilities wherever it would accelerate the introduction of more cost-effective advanced local networks, provided such initiatives are structured to maintain a competitive service environment between the two industries.

Canadian industry and government should cooperate to develop or adopt standards which would enable more efficient integration and interconnection of telephone, cable and other communications networks. Research and development (R&D) of cable/telephone integration technologies should be given a high priority in industry and government R&D programs. However, Canadian policy and regulation should not adopt an industrial strategy of accelerating the deployment of fibre lines to every home and office at a faster rate than is economically justified by market demand.

Telephone/Cable Cross-ownership

In general, neither telephone companies nor their affiliates should be permitted to directly or indirectly own or control cable systems located within their service area or the service area of an affiliate. For these purposes, telephone companies that are part of the Stentor consortium should be considered affiliates of each other.

However, telephone companies and their affiliates should be permitted to hold up to a 30% minority interest in any cable system operating within the same service area, but should not control such cable systems or prevent them from competing with a telephone company.

In addition, telephone companies and their affiliates should be permitted to own cable systems operating in remote and underserved parts of their service areas (areas equivalent to those served by the CRTC's Part III systems).

Similar ownership restrictions should apply to investments in the local wireline network operations of telephone companies by cable operators and their affiliates. No restrictions should apply to the ownership of cable or telephone operations located out of the service area of a cable or telephone company or its affiliates.

Where it is more efficient to do so, telephone companies and cable operators should be permitted to jointly own separate companies or "utilities" that operate elements of the local transmission infrastructure.

Telephone Company Entry Into Local Broadband Markets

Telephone companies should be permitted to continue to develop their local network transmission facilities to enable the distribution of a wide variety of broadband services. The rate of deployment of broadband transmission capabilities by the telephone companies should be governed by the demand for those capabilities in the markets served, and by the cost-effectiveness of the technologies deployed.

Safeguards should be adopted to prevent significant abuses of the telephone companies' dominant position in local telephone markets, and particularly to prevent subsidization of advanced capabilities to provide competitive broadband services by users of basic telephone services.

Entities that provide programming services to the public, using the transmission facilities of telephone companies or other means of telecommunication should, to the extent that they threaten the achievement of the objectives of the *Broadcasting Act*, be regulated pursuant to and in accordance with the objectives of that Act.

The Carrier/Content Distinction

As a general rule, Canadian policy and regulation should maintain the principle of the separation of the carriage and content functions in the delivery of local network services. However, the telephone and cable industries should both be permitted to participate in the provision of content-based services subject to regulatory safeguards to maintain a fair and competitive market place.

Telephone industry investments in programming and in the provision of the content of other information services should generally be made through separate affiliates. Subject to established exceptions such as the cable community channel, cable industry investments in programming and information service content should, in the future, also be made through separate affiliates.

Telephone company investments in information services affiliates (such as multimedia, video, electronic publishing and similar "content" services) should, at least for an initial five year period, be limited to a non-controlling minority ownership position.

The separate affiliate requirements proposed above should not generally apply to enhanced telecommunications services (other than information services) provided by telephone companies or to non-programming services provided by cable operators. However, an exception should be made where the CRTC considers that the provision of such services through a separate affiliate would be an effective means of ensuring that they are provided on a non-discriminatory basis and without undue cross-subsidy from monopoly telephone services or cable programming services. The CRTC should be authorized by legislation to make the appropriate divestiture orders.

The full recommendations of the co-chairs of the Committee are set out in Chapter 9 and are discussed in the relevant chapters of the report.

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CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

1.1 Background

The Canadian telecommunications infrastructure is in a state of transition. New technologies are being deployed and traditional boundaries are blurring between the telephone, cable television, broadcasting and information service industries. These developments present opportunities to provide Canadian residential and business consumers with a broad array of new information services, and to provide existing services in innovative and more efficient ways. However, they also call into question the existing policies and the regulatory framework applicable to the telecommunications infrastructure.

A considerable amount of energy has recently been devoted to the development of an appropriate regulatory framework for the Canadian long-distance telephone market, and to a lesser extent, the international, satellite, wireless and other telecommunications markets. However, despite the importance of these segments of the Canadian telecommunications market, it is frequently noted that the majority of the facilities and costs associated with the telecommunications infrastructure are found in the local network infrastructure.

Many have suggested that the Canadian public policy and regulatory framework should be reviewed to ensure that it supports the development of the kind of local network infrastructure that Canada will need to meet the requirements of the 21st century. Those calling for a review of existing approaches often focus on the fact that it is becoming increasingly possible for telephone companies and cable television operators to provide the same or similar services over their separate local networks.

Today, cable operators offer a limited number of telecommunications services that have traditionally fallen within the market of the telephone companies. These include leased local broadband data channels, and certain narrowband data services such as fire and burglary alarm services. More recently, a degree of competition has developed between the telephone and cable industries in the provision of more sophisticated information services such as Bell Canada's Alex and Videotron's Videoway. Although these services use different technologies, different types of data and video capabilities, and different user interfaces, they serve overlapping markets.

The potential exists for considerably greater convergence of telephone and cable technologies and markets. Advances in fibre optics and in digital compression and switching technologies, among others, will make it possible for telephone companies to deliver increasingly higher quality video signals, eventually enabling them to deliver television programs, and thus compete in the core market of the cable industry. Technological advances will also permit cable operators to significantly upgrade their networks, not only to deliver more and better quality television signals, but to provide more data and voice services in competition with the telephone companies.

To date, Canadian public policy and regulation has generally treated the cable and telephone industries as entirely different species. The telephone industry has been regulated as a common carrier under legislative and policy principles similar to those traditionally applied to energy pipelines and transportation companies. The focus of such regulation has been on the carriage function, and not the content of the signals carried.

The cable industry, on the other hand, has been regulated as an integral part of the "Canadian broadcasting system", governed by rules that focus largely on the content of the signals carried, including provisions relating to programming diversity, balance and Canadian cultural sovereignty.

The potential convergence of telephone and cable technologies and markets calls into question the continuation of the two solitudes of policy and regulation that have applied to the two industries.

1.2 The Organization and Work of the Committee

The Local Networks Convergence Committee was established by the Minister of Communications to review the evolution of the local telecommunications network infrastructure in Canada and to identify public policy and regulatory issues that should be reconsidered in light of this evolution. Based on this review, the co-chairs of the Committee were asked to make recommendations for government policy and regulatory action.

The work of the Committee began during the fall of 1991. It was to follow-up on a public consultation process that had been initiated by the Department of Communications in 1989. In that process,[1] the Department indicated that it was commencing an in-depth review of public policies and the regulatory environment of local networks. The Notice which launched this review cited the technological developments that provided the opportunity for the telephone and cable industries to provide increasingly similar services over what had been two very distinct networks. From the outset, the public consultation process and the Committee's work focused on the role of the telephone companies and cable operators in the future of the local network infrastructure.

Extensive written submissions were received as part of the Department's public consultation process. These submissions served to identify some of the major issues to be taken into account in any new policy and regulatory framework. The Committee took these submissions into account in its deliberations.

The Committee was composed of representatives of various parts of the private sector that have a significant interest in the evolution of the local network infrastructure. In addition to a number of highly experienced participants in the telephone and cable industries, the Committee's membership included leading members of the broadcasting industry, telecommunications network users and service providers.

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[1] Initiated on September 2, 1989, with the publication of the Department of Communications' *Canada Gazette* Notice No. DGTP-09-89, and continued by Notice No. DGTP-005-91.

Two plenary meetings of the full Committee were held during the winter and spring of 1991/2. In addition, the co-chairs met individually with Committee members, and, in some cases, other representatives of the organizations or industries with which they were associated. Furthermore, there were numerous meetings and communications with a wide variety of organizations and individuals with an interest in or with special experience related to the future of the local telecommunications infrastructure.

A Secretariat, provided by the Department of Communications to assist in the work of the Committee, prepared a series of background papers on the issues and policy options related to local networks and services which formed the basis for discussion during Committee meetings and consultations. Written submissions from Committee members and others in response to these papers provided valuable perspectives on the issues and were of great assistance in the development of the recommendations.

1.3 Public Policy Criteria

Based on general policy objectives set out in its mandate, the Committee considered what criteria should be used in developing a public policy and regulatory framework for the development of the local network infrastructure.

The criteria set out below were developed following the first plenary meeting of the Committee in preparation for the more detailed discussions to follow. The criteria were then taken into account by the co-chairs in the development of their recommendations.

The Economic Efficiency Criterion

The preliminary test used to identify the major policy issues and to assess the options for dealing with these issues was: *What policy and regulatory framework is most likely to promote the development of the most economically efficient local communications networks?*

Underlying this test is the premise that, other things being equal, government policy and regulation should support a market environment in which the Canadian public is provided the various local network services it demands, in an efficient manner and at the lowest possible price.

Given the presence of two well-developed local "wire and cable" telecommunications[2] networks in Canada today, and the prospect for greater convergence in the future, there will continue to be considerable controversy about the most efficient means to deliver various local video, data and voice services. Among the options are a single network infrastructure, duplicate or multiple infrastructures and partially integrated but competitive infrastructures.

While the economic efficiency criterion is fundamental to the development of sound policy for any industry in an increasingly globalized economy, the following additional criteria are particularly relevant to the telecommunications industry in Canada today.

Production of and Access to Canadian Cultural Products (The Cultural Criterion)

Among the central objectives of Canadian communications policy, especially in the broadcasting area, are those aimed at fostering Canadian sovereignty and identity. These objectives have been developed in the shadow of an almost overwhelming presence in Canada of attractive and accessible cultural products from the United States. For example, U.S.-originated products dominate movie screens, video stores, prime-time television and record stores in most of Canada today.

Canadian policy makers have long been concerned that the large economies of scale of the U.S. market, the dominance of U.S. distribution chains in the film, video and sound recording fields, the ethnocentrism of the U.S. market, and other socio-economic factors threaten the viability of Canadian cultural industries. It is generally felt that these factors would make it difficult for Canadian film and television production, sound recording, and other cultural industries to develop, and possibly even to survive, in the absence of government intervention.

Similar concerns generally do not apply to less culturally sensitive communications products and services, such as enhanced telecommunications services. This distinction is seen in the *Canada-U.S. Free Trade Agreement* under which the Government of Canada restricted its flexibility to establish new support mechanisms which would restrict Canada/U.S. trade in computer services and enhanced telecommunications services, but specifically exempted cultural industries from the agreement. In this context, cultural industries are defined to include broadcasting, cable television, satellite programming and broadcasting network services, as well as the book, periodical, film, video and music industries.[3]

Enhanced access to Canadian cultural products was specifically listed as one of the objectives set out in the Committee's terms of reference. It is therefore necessary to consider the impact of various policy and regulatory options for the evolution of local networks on the attainment of this objective.

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[2] Unless otherwise indicated, the term "telecommunications" is used as it is defined in Canadian legislation, to refer to both common carrier telecommunications and broadcasting. It therefore includes both telephone company and cable company telecommunications networks whether they are used for broadcasting, common carrier or other purposes.

[3] Articles 2005; 2012.

Universality of Basic Services and the Development of Advanced Services (The Universality and Advanced Services Criteria)

As we continue to move into the information age, communications and information services are of increasing significance to the lives of all Canadians. The quality of all aspects of their lives, from health and leisure to business and education, are increasingly being affected by the availability of communications services.

Canadians demand access to affordable basic telecommunications services. Moreover, past experience with developments such as single party telephone service, direct distance dialling, cellular radio, automated teller machines, new video distribution channels (e.g. video stores and satellite services) and VCRs, demonstrate that Canadians not only demand access to advanced communications services, but demand that such services be widely, if not universally, available. Thus the advanced services of one decade become the basic services of the next. In this sense, the universality and advanced services criteria covered in this section are closely related.

Accordingly, consideration must be given not only to which policy approaches will best ensure the universality of basic services, but also to which will best stimulate the efficient development and diffusion of advanced communications services.

Competitiveness of the Canadian Economy (The Competitiveness Criterion)

The increasing globalization of communications markets and of other markets for which communications is a significant input factor has increased the concern that Canada must retain and improve the competitiveness of its communications networks.

Generally, policies which are consistent with the economic efficiency criterion above would tend to best promote the competitiveness of Canadian users of telecommunications services. However, there may be circumstances in which government policies could stimulate the competitiveness of some sectors of the Canadian economy (e.g. video program production or the computer software industry) to a greater extent than would efficient local network markets left on their own.

While there is some debate about the success of such "industrial strategy" policies, they are an implicit part of the telecommunications policy of a number of Canada's major trading partners. There is a widely held view that the Canadian government should adopt policies which promote the development of the telecommunications sector, since it is one in which Canada has a comparative advantage internationally. To the extent this sector performs well, for example, in improving Canada's balance of payments or increasing opportunities for skilled employment, all Canadians will benefit.

The Committee discussions included a consideration of whether, and to what extent, various policy options for local networks will enhance the competitiveness of the Canadian economy.

The Efficient Regulation Criterion

Government policies or regulations which interfere with the normal functioning of local communications markets, should be justifiable in terms of a demonstrable public benefit. Moreover, policies and regulatory measures which pursue goals that conflict with economic efficiency should be implemented in a manner that has the least detrimental impact on the efficiency of local network services, consistent with achieving the specific policy objectives.

Accordingly, it is important to consider not only which policy options provide for effective implementation of the broader public policy criteria set out above, but also, which are likely to be the least damaging in terms of the efficiency of the local network sector.

1.4 General Findings

Bearing in mind the foregoing criteria, the general message conveyed by most members of the Committee regarding the policies and regulatory framework applicable to the Canadian local network infrastructure, was: "*the system ain't broke — so let's not fix it too much*". Various Committee members suggested changes to specific regulations or policy approaches. However, few called for a wholesale reshaping of the basic policy and regulatory framework.

The general degree of satisfaction with the status quo came as no surprise. By almost any standard, Canada has one of the most efficient, capable and widely accessible local network infrastructures in the world. Moreover, while the infrastructure will have to be upgraded significantly over the coming decades to meet the increasing demands of the information age, both of the major local network facilities operators, the telephone and cable industries, are well positioned to meet these demands.

Key characteristics of the Canadian local network infrastructure, and the ones which led to the establishment of this Committee, are that two industries rather than one supply basic local network facilities, and both industries are or will increasingly be utilizing some similar technologies — notably fibre optic cables, digital technologies and soon digital video-compression. These technologies will increasingly allow the two industries to provide *some* more or less similar but likely competitive services.

As a result, some observers have suggested that a single integrated local network infrastructure operated by one of the industries would be more efficient than two. A small minority of Committee members and of those making submissions to the Committee suggested that Canadian policy should promote the full integration of local network infrastructures as an end in itself.

However, the majority of Committee members were of the view that the current local infrastructure was well designed to serve the distinct core markets of the telephone and cable industries, namely the interactive voice and data telecommunications market and the television program distribution market. Moreover, they agreed that the current infrastructure operators were each well positioned to meet the challenges of the future.

One of the main reasons the Canadian local infrastructure is well positioned to meet these challenges is that it has become increasingly more competitive. Real and potential competition with alternative service providers, such as interexchange telecommunications services, cellular radio and other wireless telecommunications services, direct broadcast satellites, videocassette stores and others will stimulate both the telephone and cable network operators to continue to offer attractive and efficient services. In addition, increasing competition between the telephone and cable industries will cause each industry to continue to innovate and increase its efficiency in order to strengthen its long-term strategic position.

The combined decisions of hundreds of businesses and thousands of individuals in the various industries that will be competing to serve local communications markets are far more conducive to the achievement of the public policy criteria discussed earlier in this section than is any single grand plan developed by a monopolistic industry or government bureaucracy. Dynamic times call for flexible approaches, and there is too much at stake in Canada's role in the information age to gamble on a single technological approach adopted by the operators of a monopolistic, single integrated network.

Not only does the current "dual-wire" Canadian local network structure provide each of the core telephone and cable services more efficiently than a single integrated network, it is also generally conducive to the achievement of the other criteria discussed earlier in this section.

The cultural criteria are reasonably well served by the current regulatory approach under which the cable infrastructure has played an increasingly central role as a facilitator of access to Canadian television programming. While some might design a better system that would offer more Canadian programs, or more choice, the current approach has provided a reasonable balance between these two objectives. Canadians would have far less access to Canadian programs, or to a wide array of U.S. and foreign television programming, without the current cable industry and the policies and regulatory approaches that have shaped it.

The telephone and other telecommunications industries also play an essential, if somewhat less visible role in stimulating the production and provision of access to a wide variety of Canadian data, voice, sound and video services. The contents of these services will become increasingly important to the social, cultural, economic and political fabric of Canada as the information age evolves.

Of the criteria listed earlier in this section, the greatest impetus for a review of the current Canadian local network infrastructure policy and regulatory framework comes from the criteria related to the competitiveness of the Canadian economy and to the universality of basic services and the development of advanced services.

While few countries in the world can match the penetration levels, affordability and capabilities of the Canadian telephone and cable networks today, the world is not a static place. There has been a revolution in the policy and regulatory approaches governing the communications sector in almost all industrialized countries over the past decade. Old policies supporting monopolistic public utilities and PTTs[4] have been replaced by policies that promote increasingly competitive and dynamic markets with relatively open access to new entrants with new or different products or services to offer.

National boundaries are becoming increasingly transparent, partly as a result of digital and satellite technologies, and the market impacts of these more liberal and pro-competitive policy and regulatory approaches in individual countries often have transnational impacts.

Increased competition in other countries, and particularly in the U.S., has provided a strong stimulus for service and technological innovation as well as for increasing efficiency in telecommunications markets. The same trends have occurred in Canada, although the move to competition has lagged behind that of some other industrialized countries in some areas, notably in interexchange telecommunications competition. Given the globalization of international telecommunications markets, it is becoming increasingly essential that Canada keep pace with and, where possible, take the lead in adopting policy approaches which support the development and implementation of more efficient and capable telecommunications products and services.

In the context of these global trends, the future of the Canadian local telecommunications infrastructure has remained somewhat of an enigma. While the convergence of telephone, cable and other local network markets and technologies could stimulate the integration of the local network infrastructure, it could also increase competition in markets that have heretofore been dominated by one industry or the other.

In general the conclusions of this report assume that there will be a greater degree of integration of the local infrastructure over time. However, given the many benefits that a competitive market place can bring to the increasing competitiveness, innovation and efficiency of the infrastructure, the recommendations in the report do not support the movement towards a single integrated network at this time or in the foreseeable future. Not only would such a single network put the benefits of a competitive market at risk, but there is no body of engineering or economic evidence that would suggest that a single network would be more efficient.

Consequently, the more integrated local network infrastructure of the future that is foreseen in this report is characterized by the following features:

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[4] Government Postal, Telephone and Telegraph Administrations such as those that long monopolized postal and telecommunications services in Europe and elsewhere.

- greater interconnection and sharing of common network infrastructure facilities by competitors where this will permit the introduction of more efficient or advanced services than duplicate networks could provide;
- cooperative ventures for the shared use of elements of the local network infrastructure that are freely entered into between competitors because they make economic or technical sense and not simply as a result of a merger or takeover of the control of one competitor by another;
- a flexible regulatory and policy environment which permits individual firms to pursue their own interests in increasing their efficiency, capabilities and competitiveness through joint infrastructure ventures with competitors and others;
- the establishment of regulatory safeguards to maintain competition between the telephone and cable industries in all but the smallest and most remote markets; and
- the continuation of regulatory supervision to ensure that the local network infrastructure evolves in a manner that is conducive with the achievement of the objectives of the *Broadcasting Act*.

Thus, instead of a movement toward a single integrated infrastructure operated by a single local network monopoly, the trend should be towards a more competitive environment, with a mosaic of innovative service providers, interconnecting and sharing elements of their infrastructures wherever it permits the delivery of more efficient and advanced services.

To provide maximum benefits to the Canadian public, the firms operating in such an environment should neither be able to eliminate their local network competitors nor to prevent them from interconnecting or sharing infrastructure elements where it makes good economic and technical sense to do so.

It should not, in the end, be up to any individual firm, industry or government agency to determine the nature of the evolution of the local telecommunications infrastructure. Ultimately, it should be the Canadian telecommunications users who decide what services to use, and when and how to access them through the interconnected electronic highways of the networks operating in a competitive environment.

CHAPTER 2

EVOLUTION OF THE LOCAL NETWORK INFRASTRUCTURE

2.0 EVOLUTION OF THE LOCAL NETWORK INFRASTRUCTURE

2.1 Introduction

The Committee's examination of the evolution of the local network infrastructure comes in the context of the much-discussed potential for convergence of the telephone and cable television industries. The potential for such convergence has its roots in the trend towards the adoption of similar technologies by the two industries. As part of this trend, fibre has become a technology of choice for improving cable television networks. This trend has been reinforced more recently with the introduction of digital video compression. Optical fibre and digital technologies have been used for a number of years by telephone companies, in long-distance and inter-office circuits, but have also found their way into the residential access network in recent years.

A discussion of local distribution networks cannot be confined to the networks and services of the telephone and cable industries. There are other local distribution alternatives such as local microwave, wireless services, broadcasting and even satellites which are increasing their share of the overall local distribution market.

As background to the discussion of the local network infrastructure, this Chapter reviews key aspects of the evolution of local networks and services in Canada and in other countries where recent developments are particularly pertinent to this question. The material presented here is drawn from the appendices of this report.

2.2 A Comparative Assessment of the Canadian Telephone and Cable Industries

In Canada, local "wireline" networks and services have been provided almost exclusively by two groups: the telephone industry by means of its public switched telephone network, and the cable industry, with its local cable television networks. As they stand today, the delivery systems of these two groups are technologically different, and generally serve different markets and provide different services.

The primary mandate of the telephone industry has been to provide universal telephone service. To this end, the telephone network has been designed to provide bi-directional narrowband telecommunications services. Local telephone systems were designed to permit the transmission of voice (and data) from any point on the network to any other. At the time, this could only be accomplished by a switched star network architecture. Virtually all households in Canada (98.2%) are connected to the telephone network. Studies have indicated that the revenue requirement for the local telephone network is about twice the revenues the network generates and that the local facilities are subsidized by other telephone services, primarily public long-distance voice services.

Figure 2-1

Financial Profiles of the Telephone and Cable Television Industries

	1990		1989		1988		1987		1986	
	Telcos	Cable TV	Telcos	Cable TV	Telcos	Cable TV	Telcos	Cable TV	Telcos	Cable TV
Assets & Liabilities and Net Worth:										
-Assets	29509	3270	28030	2591	26027	2253	24356	1981	23199	1407
-Liabilities	16744	2611	17053	1996	16048	1861	14551	1551	14151	1083
-Long term debt	10296	813	10667	476	9814	477	9101	415	9047	369
-Shareholders' equity (net worth)	12765	659	10978	595	9979	392	9805	429	9047	324
Operating Revenues & Expenses:										
-Revenues	13302	1641	12644	1451	11880	1260	11093	1100	10601	969
-Expenses	9961	1400	9489	1166	8893	1019	7657	920	7093	806
-Net Income	3341	242	3155	285	2987	240	3435	181	3508	163
Profit before Interest and Taxes:	3595	378	3388	403	3225	343	3131	282	3128	248
Profit after Taxes (Net Profit):	1519	181	1450	218	1299	173	1157	116	1081	100
Ratios:										
-Return on Investment(2)	13.7%	14.5%	13.7%	20.7%	14.0%	18.8%	14.4%	17.8%	15.1%	23.0%
-Return on Equity (3)	11.9%	27.5%	13.2%	36.6%	13.0%	44.1%	11.8%	27.0%	11.9%	30.8%
-Debt Ratio(4)	44.6%	55.2%	49.3%	44.4%	49.6%	54.9%	48.1%	49.1%	50.0%	53.2%
-Return on Net Fixed Assets(5)	n/a	19.4%	n/a	26.0%	n/a	28.1%	n/a	27.9%	n/a	28.8%

Notes:
(1) Cable TV includes Pay & Discretionary Services.
(2) (Profit before interest and taxes)/(Total Liability & Equity - Total Current Liability)
(3) (Net Profit)/(Shareholders' equity or net worth)
(4) (Total Long-term debt)/(Total Long-term debt + Shareholders Equity or Net Worth)
(5) Based on CRTC Methodology, specific for Cable TV industry

Source: Statistics Canada's Annual Survey on Cable Television. (56-205)
Statistics Canada's Annual Survey on Telephone Companies (56-203)

The cable television industry, which for legislative and policy purposes has traditionally been viewed as part of the broadcasting system, is regulated under a statutory mandate primarily aimed at meeting Canadian cultural objectives. The cable company network is capable of distributing multiple television signals to a large number of subscribers in a cost-effective manner. Cable companies utilize a tree-and-branch network architecture which is optimal for their primary function of transmitting high bandwidth entertainment programs from one or a few points to the many points of their subscribers. About 95% of Canadian households have access to cable and 79% are subscribers. The cost of a typical cable distribution network is substantially less than for the telephone company network, and is fully met by revenues generated from subscribers.

The two industries have developed somewhat similar patterns of ownership concentration. For example, of the total number of network access services used for telecommunications 92.6% are provided by the nine companies which are members of Stentor Canadian Network Management. The Stentor companies generate 93.4% of total operating revenues. In comparison, ten cable companies provide basic cable television service to 73% of cable subscribers and generate 74% of total operating revenues. A major difference is that the serving areas of the Stentor companies cover large contiguous regions of Canada. Those of cable operators are dispersed throughout Canada and are largely confined to built up areas.

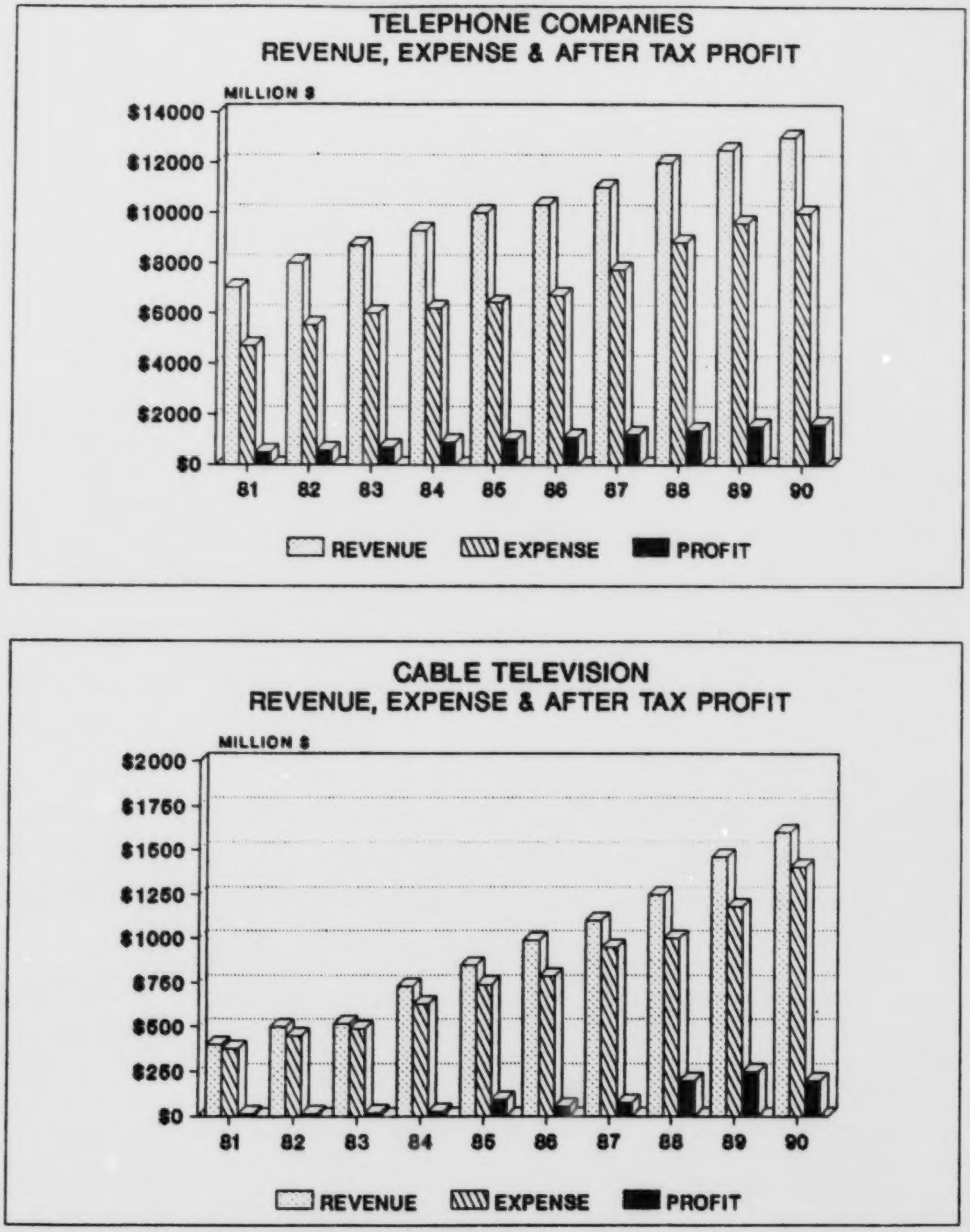
Financial profiles of the telephone and cable industries indicate substantial differences. The telephone industry is considerably larger than the cable industry. Operating revenues in 1990 were $13.3 billion and $1.6 billion, respectively, for the two industries, with revenues of the telephone industry being eight times larger. In terms of assets, the telephone industry is also much larger. The 1990 telephone company assets totalled nearly $30 billion, almost 10 times that of the cable industry.

In the last decade, the telephone industry has seen a steady improvement in its financial position. As Figure 2-1 indicates, during the period 1986 to 1990, the industry's total operating revenues increased by some 25% from $10.6 billion to $13.3 billion. The industry's total operating expenses for the same period increased from $7 billion to $10 billion, while their 1986 net profit after tax amounting to $1 billion increased by some 50% in 1990. Figure 2-2 charts these trends.

Revenue, expense and profits trends are somewhat different for the cable industry. Between 1986 and 1990, cable television revenues increased by 69% from $969 million to $1.6 billion. In 1990, cable operating expenses were $1.4 billion, representing an increase of 74% from 1986. Operating expenses increased at a rate of approximately 20% from 1989 to 1990, while operating revenues increased by about 13%. The cable industry's operating expenses have increased at a faster rate than operating revenues. Profits before taxes and interest grew steadily from 1981 to 1989. However, in 1990, cable companies reported a 17% decrease in profit after taxes, from $218 million to $181 million (see Figures 2-1 and 2-2).

Figure 2-2

Financial Profiles of the Telephone and Cable Television Industries



SOURCE: STATISTICS CANADA ANNUAL SURVEY, 1990.

The telephone industry experienced an average one to two billion dollar increase per annum in its total assets between 1986 and 1990. Shareholders' equity changed from $9 billion in 1986 to nearly $13 billion in 1990. The proportion of the telephone industry's assets financed by debt was 44.6% in 1990 and has steadily decreased since 1981 (see Figure 2-3). The debt to equity ratio in 1981 was 55%. Return on equity averaged 12% from 1981 to 1990. Although return on equity has increased since 1986, it decreased from 13.2% in 1989 to 11.9% in 1990.

Debt ratios have generally been higher in the cable industry (see Figure 2-3) than the telephone industry. While this tendency saw an exception in 1989, with a debt ratio of 44%, it returned to 55% in 1990. Major system upgrades in the late 1980s, as well as consolidation within the industry, has led to increased debt levels when compared to the equity base. From 1981 to 1990, the cable industry's return on net fixed assets averaged 24%. Return on net fixed assets has been decreasing since 1988. Returns fell from 28.1% in 1988 to 19.4% in 1990. This ratio is not available for the telephone industry. Return on equity decreased from 44.1% in 1988 to 27.5% in 1990 for the cable industry.

2.3 The Local Network Infrastructure

Current Local Networks

The telephone company local network is defined as that portion of the public switched telephone network from the local central offices to the business or residential subscriber, as shown in Figure 2-4. Different configurations exist in the local network depending on the environment (e.g. urban versus rural) and the type of subscriber (residential versus business). They all, however, maintain the basic star structure depicted in Figure 2-4.

Cable television networks have been traditionally designed with a tree-and-branch topology using coaxial cable starting with a head end, where all signals are assembled for transmission to customers (Figure 2-5). A head end can provide service for hundreds of thousands of subscribers. The design of cable television networks is optimized for one-way transmission from the head end to the subscriber. System channel capacity is limited by the bandwidth of the amplifiers required to keep analogue signal levels at a pre-determined quality level. Systems operating at 300 MHz have a capacity of 36 NTSC[5] channels, while those upgraded to 550 MHz carry up to 78 NTSC channels. The current practical upper limit for coaxial cable systems is about 150 analogue NTSC channels. Digital compression of the video signals will potentially increase this number several fold.

The cost structure of various telephone company local network configurations is presented in Figure 2-6. The cost structure varies considerably, depending on the environment and type of subscriber. For example, an initial capital investment of $3,510 to serve a rural residential

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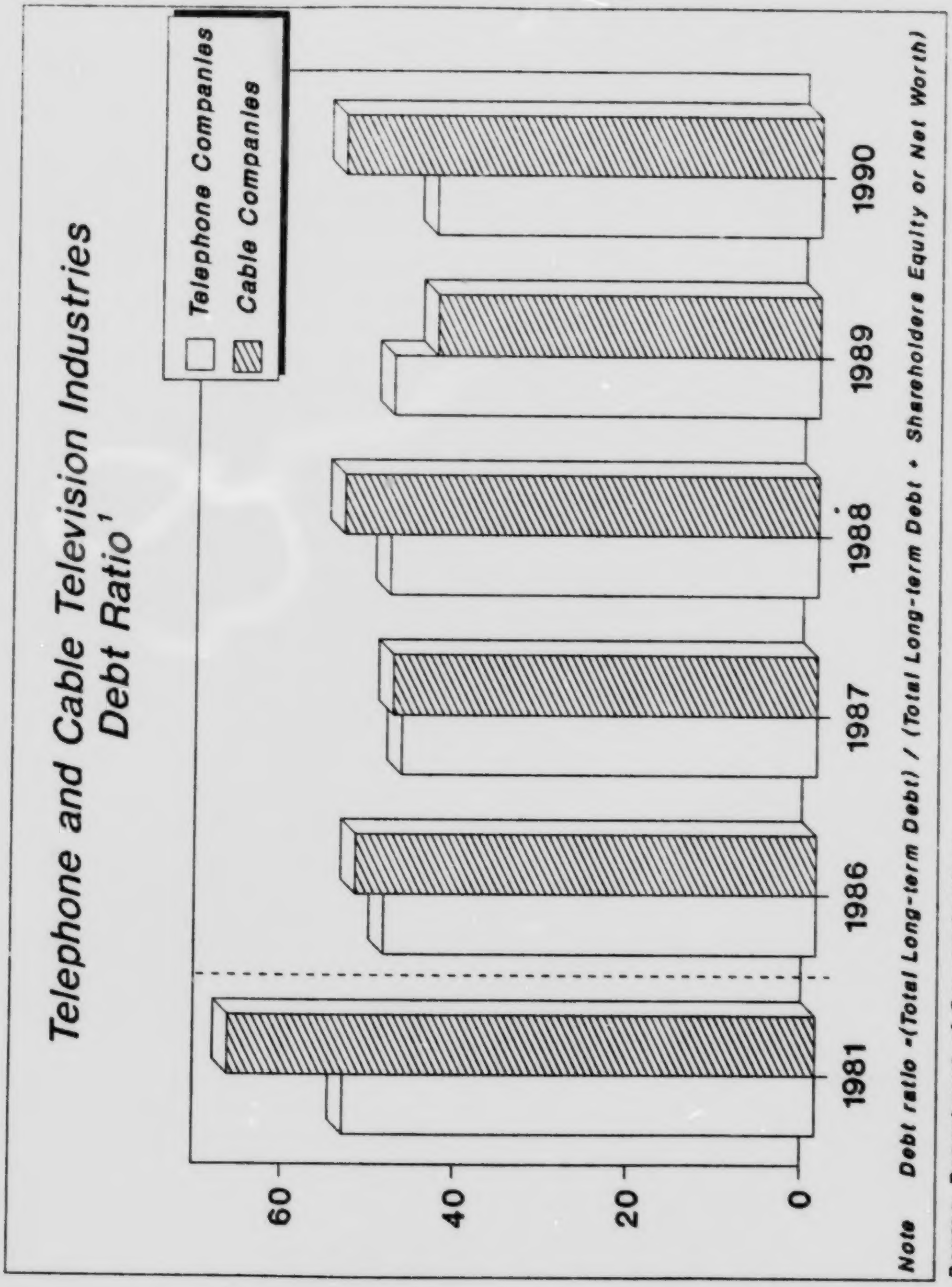
[5] NTSC — National Television Systems Committee, the transmission standard used for television broadcasting in North America, Japan and certain other countries (although NTSC is the name of the organization, it is also the name of the standard).

Figure 2-3

Telephone and Cable Television Industries Debt Ratio



Note Debt ratio =(Total Long-term Debt) / (Total Long-term Debt + Shareholders Equity or Net Worth)

Source: Department of Communications

Figure 2-4

Telephone Company Local Network

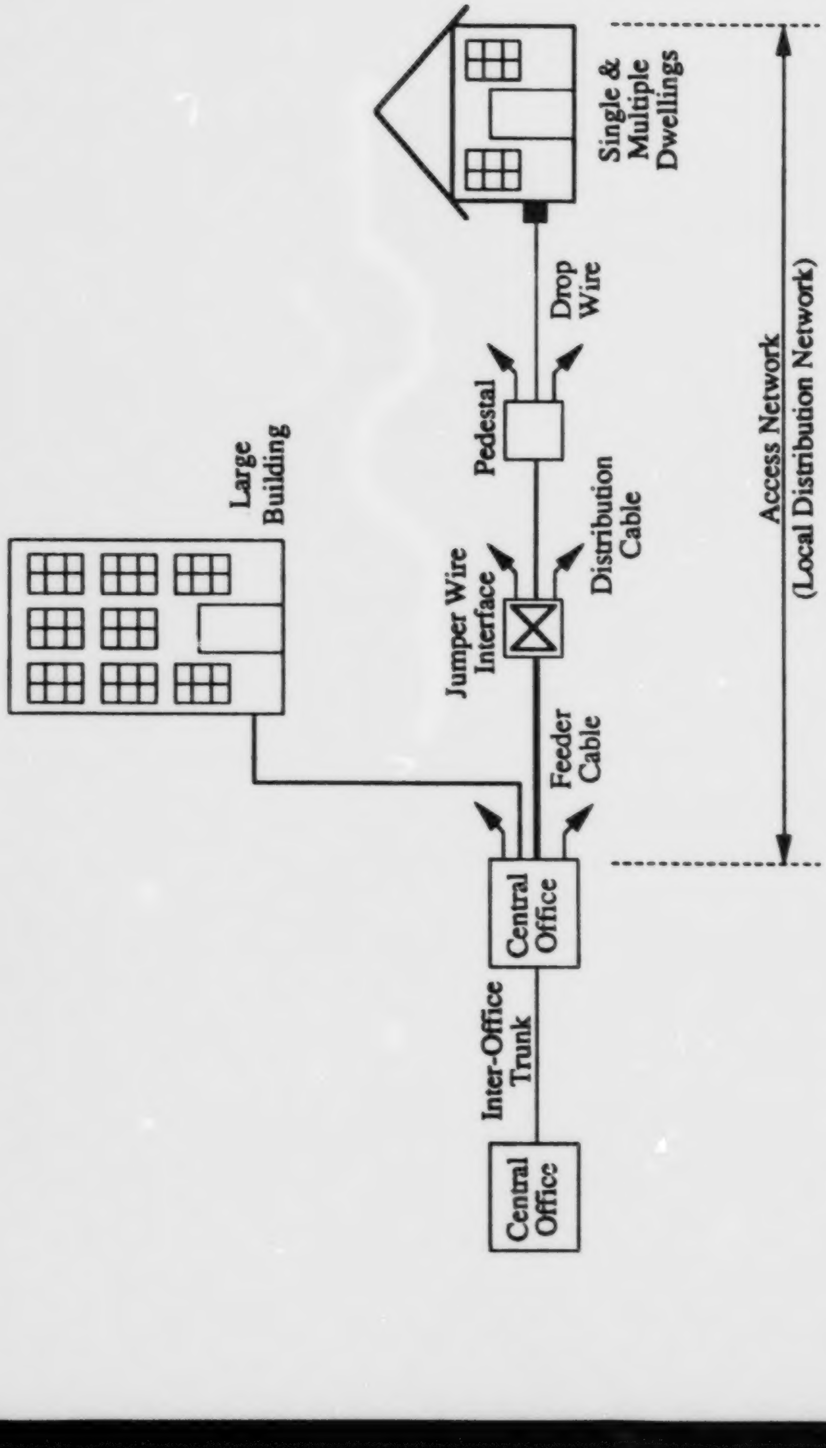
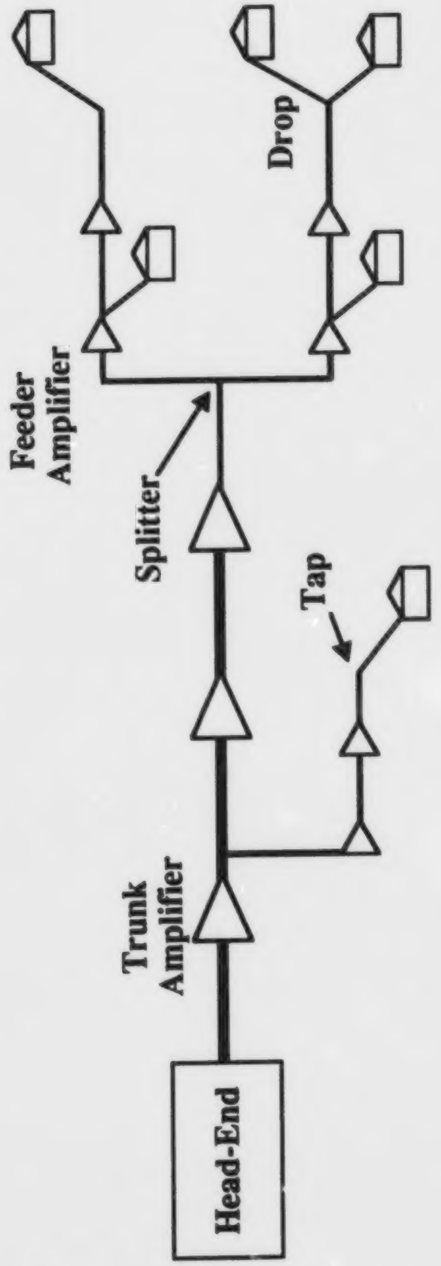

Central Office
Inter-Office Trunk
Central Office
Feeder Cable
Large Building
Jumper Wire Interface
Distribution Cable
Pedestal
Drop Wire
Single & Multiple Dwellings
Access Network
(Local Distribution Network)

Figure 2-5

Tree-and-Branch Coaxial Network


Head-End
Trunk Amplifier
Tap
Splitter
Feeder Amplifier
Drop

subscriber is not uncommon. This compares to $900 to serve a typical downtown business office. In general, the cost per line increases dramatically from downtown business locations to those in more distant or less populated areas. At the same time, the cost structure shifts from being equipment intensive (66% of the capital investment for the transmission link) in downtown business locations to cable intensive (85% of the capital investment for outside plant) in a typical rural residential location.

In the case of the cable television network a basic tree-and-branch network architecture is used whether subscribers are in urban, suburban or rural locations, with the major difference being in the distances covered and consequently the number of amplifiers required.

The total investment per subscriber for a new 550 MHz system is approximately $500. Initial capital investment for various system components has been estimated as follows:[6]

• Trunk and feeder cables	42%
• Components (amplifiers, power systems, taps, etc.)	16%
• Drop and subscriber premise equipment	42%

The cost versus capacity comparison of the two industries is dramatic. The star-based, narrowband, two-way infrastructure of the telephone companies has average costs per line ranging from approximately $900-$3,500. Cable operators, on the other hand, are able to provide a broadband, one-way, tree-and-branch system for approximately $500 per subscriber. This fact illustrates a substantial difference between the networks employed by the two industries.

Architectural Trends

The previous section describes the traditional architectures of typical telephone and cable networks. The telephone company network was designed as a single star, with narrow bandwidth and bi-directional capabilities (as shown in Figure 2-4), while cable networks were based on tree-and-branch configurations and provided unidirectional broadband transmission (as shown in Figure 2-5).

In recent years, technological advances and competitive pressures have resulted in rapid evolution of the local networks for both the telephone companies and cable operators. Telephone company networks are now being built with a variety of configurations from double star configurations to a mix of star-shaped and bus configurations (see Figure 2-7 depicting the Raynet architecture implemented by the Deutsche Bundespost) to provide for broadband services. The drive towards the Integrated Broadband Network (IBN) is a critical element in justifying the new telephone company architectures. Fibre-to-the-Home (FTTH) and Fibre-to-the-Curb (FTTC) architectures have been proposed in the U.S., and Bellcore has issued its first Technical

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[6] David P. Reed, *Residential Fiber Optic Networks* (Artech House, 1992), p. 316.

Figure 2-6

Cost Structure of Telephone Company Local Network Alternatives

LOCAL NETWORK ALTERNATIVE	COST PER LINE ($)	PERCENTAGE OF COST BY LOCAL LOOP SEGMENT				
		Outside Plant	Transmission Link	In-building	Distribution Loops	Junction Wire Interface
Downtown Business Office	900[1]	22	67	11		
Business Industrial Park	1850[2]	46	32		22	
Residential Urban and Suburban	1225[3]	18	49		33	
Residential Rural	3510[4]	85			14	1

Notes:

1 Assuming 500 lines served and a 1.5-km distance from the central office to the building
2 Assuming 500 lines and a 10-km feeder link to the remote distribution point
3 Assuming 500 lines and a 5-km feeder link to the remote distribution point
4 Assuming a feeder distance of 15 kms and a distribution loop length of 5 kms

Advisory for Fibre-in-the-Loop (FITL), as depicted in Figure 2-8. The services supported by FITL range from the provision of voice to Switched Multimegabit Digital Service (SMDS) with DS-1 access.[7]

The star/bus architectures are also being explored in cable television networks for use with regional head ends and fiber supertrunks. For the cable television companies, these new architectures provide an answer to the requirements for improved system performance and reliability while increasing the potential bandwidth of the network (1 Ghz) and building the capabilities for bi-directional interactive broadband services that would eventually compete with the telephone companies' IBN.

Ring configurations, such as the one depicted in Figure 2-9, have also gained in popularity among both telephone companies and cable operators. The main advantages of ring networks are improved network reliability, robustness and cost efficiency with respect to capital investments in cable and equipment. Telephone companies have been implementing ring configurations in their core network since the late 1980s. It is expected that ring architectures will migrate to the local networks through the 1990s as the technology and applications mature for telephone companies and cable operators alike.

Alternative Local Distribution Systems

An increasing number of alternative or supplementary systems are emerging to the local "wire and cable" networks of the telephone and cable industries.

Cellular mobile radiotelephone service has exhibited very strong growth in Canada since its inauguration in 1985. Cellular service is provided on a duopoly basis by Rogers Cantel and CellNet Canada, the latter an association of telephone company affiliates. Cellular service is now available to 80% of the population and more than 700,000 subscribers are being served by these two providers.

More recent advances in wireless technology have led to the advent of public cordless telephone systems. Such systems use digital cordless telephones that interconnect with the telephone network at public access points. The Department of Communications is proceeding with the licensing of a number of such systems.

The desire for increased flexibility in communications and advances in radio-based mobile and portable products such as cellular radio, radio paging and cordless telephone systems is giving rise to an evolution towards Personal Communications Networks (PCNs). Such networks will provide person-to-person rather than point-to-point communications. Some of the more significant characteristics projected for PCNs are:

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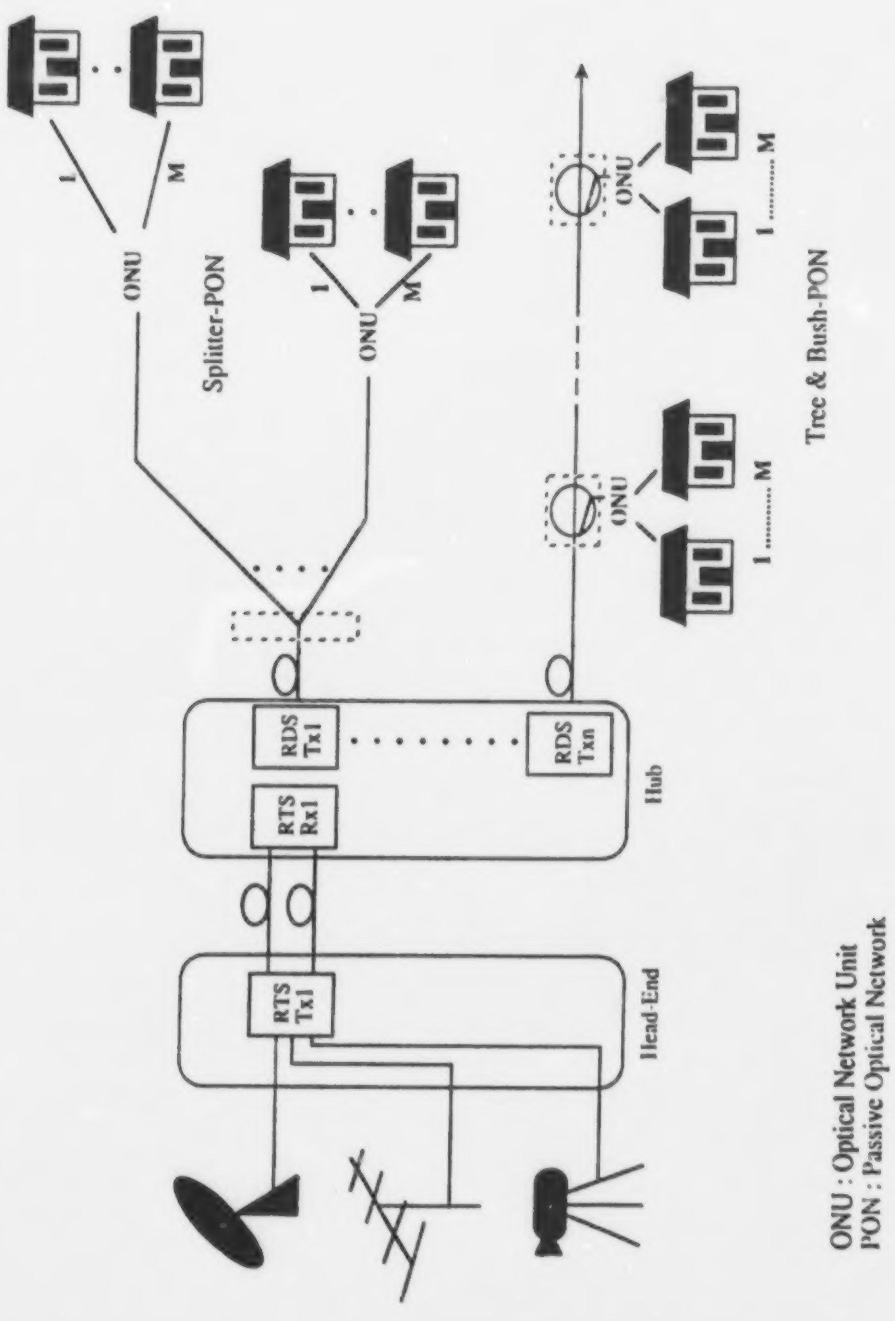
[7] Bellcore, *Generic Requirements and Objectives for Fiber In The Loop*, TA-NWT-000909, Issue 1, December 1990.

Figure 2-7

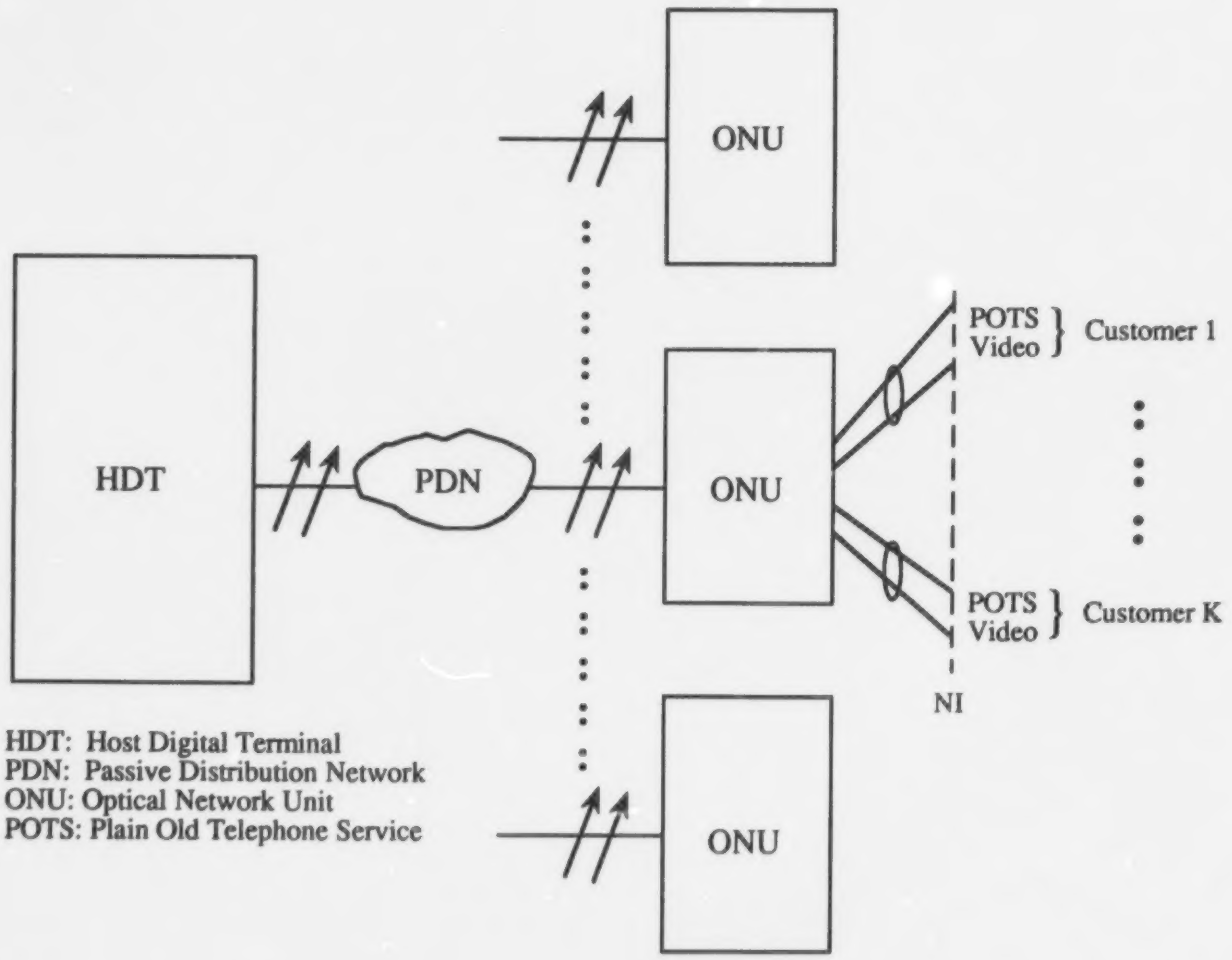
Raynet Distribution System (RDS)


Head-End
RTS Tx1
RTS Rx1
Hub
RDS Tx1
RDS Txn
Splitter-PON
ONU
1
M
ONU
1
M
Tree & Bush-PON
ONU
1 .... M
ONU
1 .... M

ONU : Optical Network Unit
PON : Passive Optical Network

Figure 2-8

Generic FITL by Bellcore

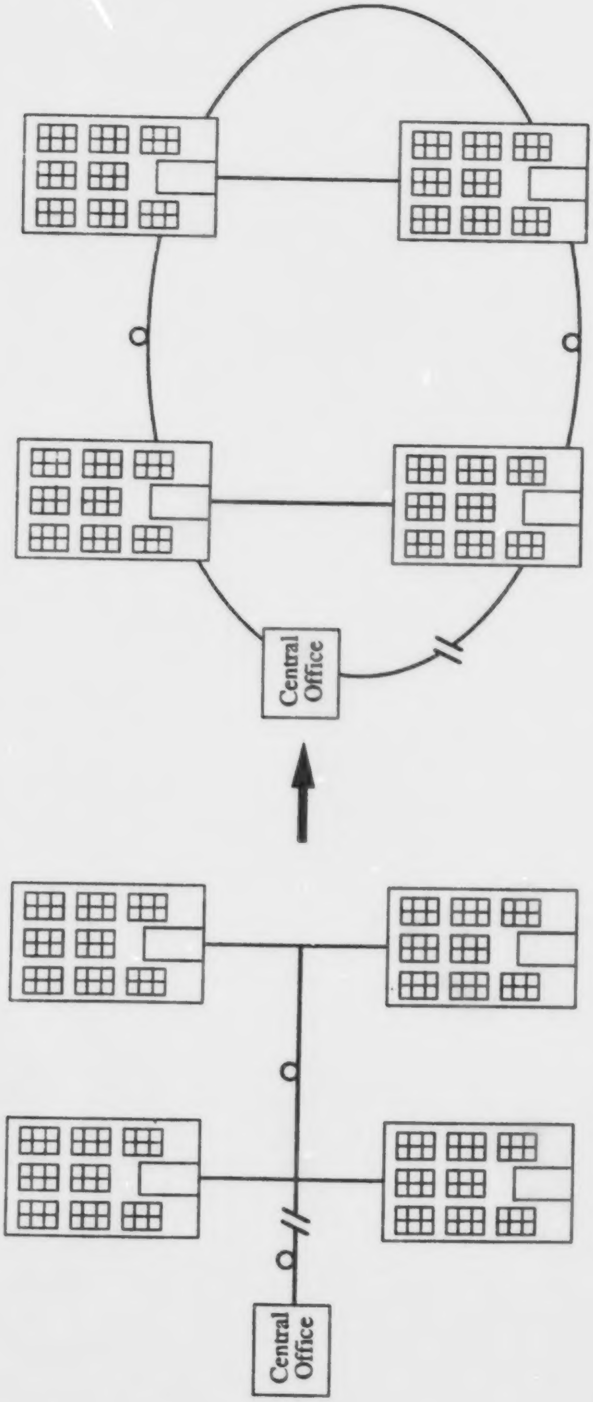

HDT
PDN
ONU
ONU
ONU
POTS
Video
Customer 1
POTS
Video
Customer K
NI

HDT: Host Digital Terminal
PDN: Passive Distribution Network
ONU: Optical Network Unit
POTS: Plain Old Telephone Service

SOURCE: Bellcore TA-NWT-000909, December 1990

Figure 2-9

Telephone Company Migration to Ring Networks


Central Office
Central Office

- direct seamless connectivity of people to other people, services and information through personal numbering systems and intelligent network architectures;

- the development of a high degree of service mobility and portability through complementary developments and interconnection of both fixed and mobile networks and the development of easy-to-use, portable multimedia terminals;

- the integration of different forms of information (data, text, image and voice); and

- personalization of network and service provisioning through the application of computer intelligence and the development of natural system interfaces (personal agents).[8] Some industry experts expect that personal mobility will continue to be an increasingly important factor affecting the development of future networks. In this regard, it is expected that wireless networks will become a significant competitor with local telephone wireline networks.

Over-the-air television and radio have always been alternatives to cable delivery of television and radio programming, although over-the-air television is becoming increasingly less viable in both urban and rural markets. Technical, consumer and competitive factors are changing the world of television and radio as we know it. Television appears to be evolving from a passive "viewing" experience to a more active "using" one, and from "programming" to "accessing". Pay television services and the recently licensed pay-per-view services are indicative of the trend away from advertising-supported to subscription-based viewing. The arrival of U.S.-based direct broadcasting satellite services in Canada could also have a significant impact on Canadian television broadcasters.

Technological developments are also making possible alternative delivery of radio programming. Digital-audio-broadcasting poses a potential alternative (or supplement) to the existing means of receiving radio programming into the home.

As broadcasting and wireless communications systems adopt digital technologies, and particularly advanced digital compression, the potential arises for more efficient utilization of the radio spectrum. More efficient use of the spectrum would free available bandwidth for the introduction of more local distribution services by broadcasters and other communications service providers. This in turn could lead to an even more competitive local network environment.

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[8] *Vision 2000, The Future of Personal Communications in Canada*, (presentation to the NBI Canada 1990 Executive Briefing, 1990), p. 27.

Figure 2-10

1990 Local Service Revenues of the Canadian Telephone and Cable Television Industries
($ millions)

SERVICE CATEGORY BY INDUSTRY	ESTIMATED 1990 REVENUES[1]	PERCENTAGE OF TOTAL INDUSTRY
Telephone Industry		
Monopoly Local[2]	4347	72.3
Competitive Local		
- network services	516	8.6
- terminals	1152	19.1
TOTAL	6015	100.0
Cable Industry		
Monopoly		
- basic cable service	1357	82.7
- pay and specialty services	284	17.3
TOTAL	1641	100.0
Combined Local Services Revenues		
Monopoly	5988	92.1
Competitive	516	7.9
TOTAL	6504	100.0

Notes: 1 The breakdown of telephone industry revenues is based on Phase III Cost Inquiry 1990 actual results. The ratios used to allocate the total industry revenue were derived from Bell Canada's figures. Terminal revenues were allocated between local and long distance based on a 60/40 ratio.

2 Monopoly local revenues are those derived from: the provision of basic telephone service, network access services, installation, maintenance, and other related services.

2.4 Local Network Services

Monopoly Local Services

Local telephone and cable networks have been optimized to meet the requirements of their respective core markets. As indicated previously, the former specializes in narrowband point-to-point services, while the latter specializes in broadband point-to-multipoint services.

The large majority of local distribution revenues generated by each of the two industries comes from monopoly services. Figure 2-10 indicates that 92.1% of local combined revenues for the two industries in 1990 were from monopoly services. Telephone companies generated $4.3 billion from monopoly local services which included basic telephone service, network access services, installation, maintenance and other related services provided to local residential and business subscribers. The cable industry generated $1.6 billion from the provision of basic cable service, and pay and specialty services.

The CRTC regulates the provision and pricing of basic local telephone service. Basic local residential and business telephone services are offered on a monthly flat-rate basis. Two of the traditional principles in local telephone rate-setting involve support for the universality or widespread affordability of service and "value-of-service" pricing. The implementation of these principles leads to higher rates in some local calling areas with many subscribers than other areas with fewer subscribers. In addition, business telephone rates are higher than residential subscriber rates in the same calling area because the service is considered to be more valuable to businesses. Thus, affordability of basic telephone service has been promoted by means of pricing policies not based on costs.

The provision of basic cable service is the cable industry's core service and generated 83% or almost $1.4 billion of its revenues in 1990. Basic cable service is defined as those services that are offered to all cable subscribers for a monthly basic fee.

Pursuant to the *Cable Television Regulations, 1986*, a cable licensee is required to give priority carriage to Canadian services such as over-the-air stations, provincial educational networks, a community channel and the House of Commons channel. Basic cable service also includes the three major commercial U.S. networks and the U.S. public television network (referred to as the 3 + 1). In some cases, the basic service may also include additional services such as U.S. superstations, Canadian specialty services and non-programming services. The launch of certain specialty services in 1988 accelerated the introduction of an "extended basic" package. The extended basic package refers to a secondary tier of signals provided at a low rate, usually on a negative option basis. It is usually made up of a mix of Canadian and American specialty services, superstations and other signals not carried on the basic tier. The majority of Canadian households (79%) subscribe to basic cable television service, making cable television companies the main distributors of television programming services to the residential market.[9] The cable industry foresees continued growth in the 1990s both in the penetration level of basic cable service and in subscriber reach. The total number of households with access to basic cable service (households passed) is expected to be 10.45 million in 1996, while the subscriber base should reach 8.74 million.[10]

Since 1983, when pay television was licensed by the CRTC, the cable industry has also been earning revenues from the distribution of programming services on a discretionary, user-pay basis. Pay television networks include movie channels, the Family Channel, Cathay, Chinavision, Telelatino, Canal Famille and Super Ecran. The penetration ratio for pay television is lower than the penetration ratio for basic cable service.[11] In 1990, the penetration ratio for premium movie services was 11%. In the past two years, the penetration ratio of premium movie services has experienced a decline due largely to the migration of some specialty services to the basic cable service. In 1990, the cable industry earned 17% of its total revenues from the provision of discretionary services.[12]

The greatest competitor to pay-television services is perceived to be the home video industry which, unlike the cable industry, is unregulated. The majority of Canadian households have VCRs. Canadians spend approximately $1 billion annually on the rental of video cassettes.[13] In 1989, premium movie services generated total revenues of about $220 million, which represented less than 25% of the video retail industry's total revenue for that year.[14]

In 1992, the CRTC first licensed pay-per-view services (PPV). PPV services offer movies, concerts and sports events on a user-pay basis. The licensing of PPV services by the CRTC is a recognition of consumer demand for a greater selection of entertainment video services and greater flexibility in the scheduling of these services. In licensing a PPV service in 1992, the CRTC noted the importance of user control in the selection of programs:

> [pay-per-view] . . . will . . . increase [the] range of entertainment choice within the broadcasting system, [it] will give cable TV subscribers a new dimension of control over the programming they select and the viewing time which is most convenient for them.

Competitive Local Services

A small portion of the local service revenues of the telephone and cable industries is derived from competitive services (Figure 2-10). In the case of the telephone companies, local network and terminal services are largely provided in competition with the terminal equipment sales industry and Unitel, and to a lesser extent the cable industry. Competitive local telephone services include the provision of leased circuits, various data services and information retrieval services. In the latter category telephone companies have introduced information services such as Bell Canada's Alex.

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[9] "Programming service" is defined in the *Cable Television Regulations, 1986* as a combination of images, sounds or images and sounds including a commercial message, other than an alphanumeric service, that is designed to inform or entertain the public.

[10] Canadian Cable Television Association (CCTA), *Project 96* (Ottawa, 1991), p. 5.

[11] *Ibid.*, p. 8.

[12] Department of Communications estimate based on Statistics Canada sources.

[13] *Project 96*, p. 12.

[14] *Ibid.*

The services offered on Alex include home shopping, banking and other information services. It is worthwhile to note that the principle of separation of content and carriage that has traditionally applied to telephone companies has limited the ability of telephone companies to provide certain information-based services like electronic publishing.[15]

As indicated in Figure 2-10, the provision of competitive local services, excluding competitive terminals, accounted for $516 million or about 8.6% of the total local telephone industry revenues.

Canada, as noted earlier, has licensed two national cellular operators, Rogers Cantel and CellNet Canada. In 1990, Canada's two largest cellular operators, Rogers Cantel and Bell Cellular, the largest member of CellNet, had total revenues of $530 million.[16]

While most of the basic local telephone services are provided by the telecommunications carriers, in some instances business users build their own local and/or long-distance private line networks utilizing, for example, microwave or fibre optic facilities. These networks bypass the public switched telephone network.

Non-programming services provided by cable operators cover a variety of market segments, services and applications. Most cable operators offer alphanumeric services such as classified and real estate advertising and home shopping. In 1988, 4.3 million subscribers were provided with alphanumeric services.[17] Other non-programming services such as interactive consumer information and telecommunications services are less widespread. These services include: messaging services (electronic mail, voice messaging); access/retrieval services (videotex), access to databases (news, weather); transaction services (home shopping, home banking); telemetry (security, meter reading). Vidéotron's Videoway system is considered a leader in the provision of interactive consumer information services. The Videoway system provides access to a variety of information services on an interactive or partially interactive basis to an estimated 150,000 subscribers in various parts of Canada.[18]

The larger cable operators, such as Rogers Cable Television (Rogers) in Toronto and Vancouver, and Vidéotron in Montreal and Quebec City, currently offer telecommunications services to a number of business customers. These services include point-to-point local voice and data circuits. Rogers, for example, makes available fibre and coaxial cable capacity to provide channels for local circuits between business offices and computing facilities. Vidéotron makes available excess fibre capacity to provide intercity private line service.

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[15] See CRTC Telecom Decision 84-18.

[16] Department of Communications estimate.

[17] Leigh Anderson, *Economic Implications of New Information Technologies on Current CRTC Broadcasting Regulations*, (1990), p. 42.

[18] "Le Groupe Vidéotron and Shaw Cable Join Cablelabs", *Specs International*, (1992), p. 1.

The opportunities to provide telecommunications services are somewhat limited by the fact that business communications requirements often extend beyond the limits of a cable-serving area. Nevertheless, it is expected that the increasing deployment of fibre in the cable network will enable cable companies to become significant alternative suppliers of some telecommunications services. Ring architectures are being deployed by Rogers, and trials are being conducted with high-speed packet services. Several cable companies are currently examining the feasibility of developing Personal Communication Network (PCN) services. Other large cable companies may develop Metropolitan Area Network business services through alliances with the computer industry.

Despite all of these developments, the provision of non-programming services by cable companies represents an insignificant proportion of the industry's current revenues. In 1991, the cable industry's provision of non-programming services accounted for $23 million or about 1.4% of the industry's total revenues.[19] However, the industry's strategic plan for the next decade has identified future growth prospects in this area, particularly in the consumer information services market and in niche telecommunications service markets.[20]

Prospective Local Markets and Services

As noted in the discussion of the local network infrastructure, telephone companies networks are moving in the direction of including a switched broadband transmission capability, thus enabling the offering of a broadband dialtone capability, or video dialtone (VDT) as it has been referred to in the U.S. While there is much debate, particularly in the U.S., on what constitutes VDT, it is generally felt that a VDT service would utilize a fibre-based, interactive, digital, broadband network, possibly in conjunction with highly compressed digital transmission over local copper loops, to reach residential and business premises. Telephone companies in Canada see VDT as a subset of a broadband dialtone (BBDT) service. The range of BBDT service possibilities include customer-dialled access to information, transaction and entertainment services, distribution of video signals to several locations simultaneously, interchange of video signals for business video conferencing, consumer videophone, or other video applications and interactive multimedia applications.

The cable industry's strategic plan projects future growth in the provision of discretionary services and in the development of new video services such as Near-Video-on-Demand (NVOD).[21] NVOD could, in fact, form a major part of the cable service offerings in the next five to ten years. According to the industry's strategic plan, cable operators will invest a total of $2.1 billion over the 1991-1995 period upgrading their systems.[22] The resulting increased channel capacity is consistent with the industry's strategy to generate increased revenues in the provision of new services.

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[19] Department of Communications estimate based on Statistics Canada sources.
[20] *Vision 2001*, 1992.
[21] *Ibid.*

2.5 Policy and Regulation — The Historical Context

Regulation of the Telephone Industry

Canadian telephone company regulation has its origins in the telegraph and railway legislation of the 1800s. From the early days of telecommunications carrier legislation, carriers were subject to rules that prevented discrimination among customers.[23] In 1892, amendments to the *Special Act of the Bell Telephone Company of Canada*, first introduced telephone rate regulation by prohibiting Bell from increasing its rates without the approval of the federal Cabinet.

In 1906, the *Railway Act*[24] was amended to extend the jurisdiction of the Board of Railway Commissioners for Canada to include regulation of the rates of all telephone companies under federal jurisdiction. The *Railway Act* was further amended in 1908 to extend the Board's jurisdiction to telegraph rates, and to apply to telephone and telegraph companies the Act's provisions requiring rates to be reasonable and prohibiting unjust discrimination or preference. A number of further amendments and consolidations of the Act were made over the years, however the thrust of most of the substantive provisions of the legislation has remained essentially unchanged since the early years of this century.

Other significant regulatory provisions affecting telecommunications common carriers are found in the *National Telecommunications Powers and Procedures Act*,[25] the *Telegraphs Act*[26] and the special legislation governing individual telecommunications carriers, including Bell Canada, B.C. Telephone Company, Teleglobe Canada and Telesat Canada. Among the provisions of the special legislation relevant to this report is one which requires Bell Canada to act solely as a common carrier where it provides transmission services or facilities, and in that context prohibits the company from controlling the contents or influencing the meaning or the purpose of messages it transmits. As discussed in Chapter 8, the spirit of this provision has been applied to other federally regulated telephone companies.

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[22] *Ibid.*

[23] The first such legislative provision in Canada was included in a section of an 1852 telegraphs statute which required messages to be dispatched in the order they were received. See: Peter S. Grant, *Canadian Communications Law and Policy*, Vol. I (Toronto: Law Society of Upper Canada, 1988), p. 3.

[24] Now the *Railway Act*, R.S.C. 1985, c. R-3, as amended.

[25] R.S.C. 1985, c. N-20, as amended by 1987, c. 34, ss. 301-309, proclaimed in force, Jan. 1, 1988.

[26] R.S.C. 1985, c. T-5, as amended.

On February 27, 1992, the federal government tabled *Bill C-62*,[27] a comprehensive revision and consolidation of Canadian telecommunications legislation. While the Bill updates many of the regulatory provisions found in the legislation listed above, it maintains the essence of the provisions which are key to common carrier regulation, including the rate regulation sections and the prohibition against unjust discrimination. If passed, *Bill C-62* will introduce significant new rules requiring a high level of Canadian ownership of the major common carriers, authorizing regulatory forbearance and exemption from regulation of competitive and other telecommunications services, and increasing the degree of government oversight and involvement in the regulatory process.

In 1938, regulatory jurisdiction over telephone and telegraph companies was transferred from the Board of Railway Commissioners to the Board of Transport Commissioners; in 1967, to the Canadian Transport Commission, and in 1976, to the Canadian Radio-television and Telecommunications Commission (CRTC). Today most Canadian telephone companies and other major providers of common carrier telecommunications services, notably Unitel Communications Inc., Telesat Canada and Teleglobe Canada, are regulated by the CRTC.

For most of this century, however, the telephone companies in the prairie provinces and Atlantic provinces were regulated by provincial public utilities boards[28] instead of the CRTC. A major shift in jurisdiction occurred as a result of the 1989 Supreme Court of Canada decision in *Alberta Government Telephones* v. *Canadian Radio-television and Telecommunications Commission and CNCP, et al*[29] which held that the major Canadian telephone companies which were members of Telecom Canada (now Stentor) were in fact interprovincial undertakings and thus subject to federal rather than provincial jurisdiction.

However, because of a "crown" or government immunity clause in the *Railway Act*, the Supreme Court ruled that the three telephone corporations that were owned by provincial governments were exempt from CRTC regulation. While AGT has since been privatized and thus became subject to CRTC regulation, the provincial telephone corporations in Saskatchewan and Manitoba have not. The Government of Manitoba has agreed that its telephone corporation, MTS, will become subject to CRTC regulation when *Bill C-62* is passed, and while Saskatchewan has not entered into a similar agreement the present wording of the Bill would also subject its telephone corporation to CRTC regulation.

A number of smaller "independent" telephone companies, notably in Ontario and Quebec, remain subject to provincial regulatory agencies. The Edmonton Telephones Corporation operates as a private corporation, wholly owned by the City of Edmonton, and is regulated pursuant to the *Alberta Telecommunications Act* by the Edmonton City Council.

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[27] *An Act respecting telecommunications*, 3rd Session, 34th Parliament, 40-41 Elizabeth II, 1991-92.

[28] In the case of Saskatchewan, by the provincial Cabinet.

[29] [1989] 2 S.C.R. 225.

The CRTC, as well as the provincial boards that have regulated Canadian telephone companies, have generally determined the overall reasonableness of telephone rates based on a variant of the rate base/rate of return method applied to other monopolistic utilities.[30] It is likely that in the future the CRTC, like telecommunications regulators around the world, will explore alternatives to traditional rate base/rate of return regulation, such as price cap regulation, that may provide greater incentives for telephone company efficiency and innovation.

While there is no explicit facilities construction approval requirement applicable to federally regulated telephone companies, their construction programs have been subject to CRTC scrutiny as part of an annual Construction Program Review process. In recent years this process has provided a forum for the discussion of the reasonableness of telephone company plans to install fibre optic facilities and other plant that will permit increased broadband capabilities to be introduced in various parts of their networks. Ancillary CRTC regulatory mechanisms, such as the Telecommunications Cost Inquiry, have provided safeguards aimed at identifying subsidization of competitive services from monopoly revenues and preventing other abuses of the market power of the telephone companies.

Regulation of the Cable Industry

Cable television system operators became subject to CRTC regulation in 1968, pursuant to the provisions of the *Broadcasting Act*[31] passed in that year. Prior to that time, the nascent cable industry had been regulated to a more limited extent by the Minister of Transport.

Since 1968, the focus of the CRTC's regulatory approach has been to ensure the smooth integration of cable into the Canadian broadcasting system. This approach has taken into account the ever increasing demand to expand viewer choice while maintaining the viability of local broadcast licensees and encouraging a contribution by the cable industry to Canadian program production.

At first, the CRTC viewed cable television as a threat to the survival of Canadian over-the-air broadcast licensees. In the early years of the industry, cable relied heavily on the importation of U.S. border station television signals to attract customers. The Commission noted in a February, 1971 policy statement that "unlimited penetration by United States stations on a wholesale south to north basis would completely destroy the licensing logic of the Canadian broadcasting system" and pose financial peril for Canadian licensees. By the 1980s, however, cable television was recognized by the Commission as the means by which most Canadians gained access to Canadian and foreign programming sources. By that time a number of new Canadian pay and specialty programming services relied on cable as their sole means of access to Canadian homes, and viability of these services was of considerable concern to the CRTC.

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[30] See Appendix C for a more complete discussion of the approach to the regulation of telephone companies and cable operators.

[31] R.S.C. 1985, c. B-9.

In addition, it was recognized by the CRTC that cable had a significant role to play in extending programming services to remote and underserved parts of Canada. This role was formally recognized in the Commission's response to the 1985 report of the Task Force on Access to Television in Underserved Communities (the Klingle report).[32]

The CRTC published its first comprehensive cable policy statement on July 16, 1971.[33] In the statement, the Commission established signal carriage priority rules. These rules granted priority to certain local and regional signals and limited the allowable number of non-Canadian signals that could be carried on any system. The policy statement also promoted the establishment of a non-commercial local programming "community" channel. At that time, the CRTC also adopted a policy of permitting a higher priority television station, such as a local Canadian station, to require a local cable operator to substitute that station's programs and commercials for identical programs originating from a station with lower carriage priority, such as distant U.S. stations. This policy evolved over time into the present "simultaneous substitution" rules.

The CRTC's first cable television regulations were published in November 1975. These regulations dealt with a variety of matters that shaped the industry's service offerings. Among other things the regulations established radio and television service priorities, thus codifying the priority carriage policy, provided for the allocation of frequencies according to priority, required cable systems to reserve a channel for provincial educational broadcasting services, and required cable systems to provide a community channel.

While the regulations formalized some of the earlier policies of the Commission, they left many areas of cable activity to be regulated by conditions of licence and by requiring pre-authorization for such matters as the addition of services and rate increases.

The *Cable Television Regulations, 1986*[34] ushered in an era of more streamlined cable regulation and for the first time provided a different, far lighter-handed regulatory approach for small systems.

Perhaps the most significant change brought about by the 1986 regulations was the partial deregulation of rate-setting. One of the CRTC's primary objectives in revising the cable regulations was to reduce the amount of regulatory burden on cable systems, and thereby to reduce the Commission's own workload as well. The 1986 regulations provided for an automatic basic rate increase up to 80% of the Consumer Price Index; permitted automatic pass-through of cost increases associated with carrying new programming services as well as for microwave, pole and conduit use; and permitted cable systems to increase the basic rate by 10% of the annual cost of capital expenditures (CAPEX) distributed over the subscriber base.

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[32] Public Notice CRTC 1985-61, *Distant Canadian Television Signals*, March 22, 1985.

[33] *Canadian Broadcasting "A Single System" — Policy Statement on Cable Television* (Ottawa: Canadian Radio-Television Commission), 1971.

[34] "Broadcasting Act — Cable Television Regulations, 1986", *Canada Gazette* (Part II, Vol. 120, No. 17) (SOR/86-831, August 1, 1986).

The CAPEX increase was introduced to provide an incentive to cable systems to upgrade their carriage capabilities so that they would be able to distribute as many services as possible.

Other highlights of the 1986 regulations included:

- cable company ownership of their head end facilities, amplifiers, and subscriber drops was required by regulation rather than as a condition of licence;
- a requirement in the regulations that a majority of programming services carried on any system must be Canadian;
- carriage of non-programming services was generally exempt from the regulations; and
- limited advertising was permitted on the community channel.

Generally, the new regulations recognized the increasing availability of new conventional and satellite programming services and the emergence of non-programming cable services, some of which competed with the telephone company services. The regulations were intended to foster more flexibility and increased revenue-earning power to cable operators enabling them to respond more ably and more immediately to competitive pressures in the video program distribution market, such as those arising from video stores and direct-to-home satellite services.

The CRTC created new classes of licensees to implement its light-handed regulatory approach to systems serving remote and underserved areas. Systems serving areas where there were two or fewer Canadian signals available off-air came to be governed by Part III of the regulations and became known as "Part III licensees". A very minimal regulatory approach was applied to Part III licensees, with no rate regulation and fewer constraints on service offerings. All other licensees were subject to the requirements contained in Part II of the regulations and were divided into Class 1 licensees (serving 6,000 subscribers or more) and Class 2 licensees (serving less than 6,000 subscribers).

The new 1991 *Broadcasting Act*[35] updated and expanded the provisions of the 1968 Act as they related to cable television systems and similar operations, which are now defined as "distribution undertakings". The implications of various provisions of the new Act are discussed in the context of the relevant subjects dealt with in the balance of this report.

The Current Policy and Regulatory Framework

As is evident from the foregoing discussion, the historical origins and objectives of telephone and cable regulation are quite distinct. Telephone companies have been regulated as common carriers, with a strong focus on rate regulation and other measures to prevent discrimination or other abuses of monopoly power. The cable industry, on the other hand, has been regulated, originally as an adjunct, and more recently as a central player in the Canadian broadcasting system. The focus of cable regulation has been on the advancement of the social and cultural objectives of the *Broadcasting Act*.

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[35] S.C. 1991, c. 11.

Various specific elements of the current policy and regulatory framework applicable to the telephone and cable industries make up the subject matter of the rest of this report. A further description of a number of the main policy and regulatory provisions can be found in Appendix C.

2.6 International Perspective

Canada is not alone in dealing with the issue of local network convergence. This section briefly examines how similar issues are being dealt with outside of Canada.

Policy Proposals by the Organisation for Economic Cooperation and Development (OECD)

The OECD Directorate for Science, Technology and Industry Committee for Information, Computer and Communications Policy takes the position that convergence of the communications industries is taking place through three main processes — technical, functional and corporate convergence.[36] From a technical point of view, the Committee concluded that digital information flow will make it no longer feasible to treat the computing, telecommunications and broadcasting industries as separate sectors. Functional convergence refers to the development of new hybrid services, based on the use of fibre optic technology, with increasing integration of voice, text, data and image. In terms of corporate convergence, the Committee stated that both telecommunications operators and broadcasters now draw their revenues from broader sources. However, corporate convergence is most likely to come from equipment manufacturers, who have the most to gain from new markets.

The Committee also examined the telecommunications investment strategies of OECD countries; ranging from supply-led, which anticipates demand, to demand-led, which responds to user demands. The Committee called for a balance between the two extremes. It cautioned that while countries which adopt a demand-led strategy claim to reap benefits from closer attention to user demand, there remains the danger that no long-term policy vision will emerge and that development will be piecemeal and uncoordinated.

The Committee proposed a new model for approaching convergence issues. The title of its paper "A 1990s Vision of Network Evolution Towards Diversity" indicates its thrust:

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[36] OECD Directorate for Science, Technology and Industry Committee for Information, Computer and Communications Policy, *Convergence Between Communications Technologies: A Policy Review*, ICCP 29 (forthcoming).

- multiple network providers competing on the basis of alternative technologies (e.g. twisted pair, coaxial cable, fibre, radio, satellite, and hybrids);

- demand-driven investment based on "personal" voice, fax and entertainment services;

- dilution of service revenues between transmission media in the context of an enlarged total market;

- divergence of residential and business requirements and continuing separation of telecommunications and television infrastructures;

- continuity of "obsolete" services which compete against newer technologies on price and reliability and trickle down to the small firm/residential market.

The model involves a high degree of overlap and duplication, but also, crucially, more competition both between alternative transmission media and competing network providers. The model is probably less efficient in terms of investment strategy, but it does imply more choice for users, including pricing choices.

The Committee concluded that it is not so necessary for regulators to keep telecommunications and broadcasting networks structurally separated. It suggested that, indeed, there are strong arguments in favour of allowing network sharing on the grounds of technical and environmental efficiency and that there are few remaining arguments in favour of continuing the separation of telecommunications and broadcasting services. It noted that there is no real pressure from service providers at present to allow cross-sectoral provision of services, but equally, there is no compelling reason to disallow it. It was argued that regulators should seek a new role in policing access to, and interconnection of, public networks. The Committee made the following eight policy proposals for the regulation of networks and services under "convergence":

- Restrictions against cross-provision should apply only to firms with an actual or potential dominant market position.

- Restrictions on cross-ownership should only be considered for acquisitions by firms with an existing dominant market position.

- Network sharing should be promoted where it creates new services or provides new investment which would not otherwise exist.

- Sharing of network facilities and support services should be actively encouraged where it leads to reduced costs and greater environmental efficiency.

- Policy makers should not attempt to specify a minimum viable scale for market players.

- Regulators should move towards a market mechanism for allocating the civil radio frequency spectrum.
- Licences for carriers and service providers should not specify what technology or mode of delivery should be used.
- Regulators should be principally concerned with issues of access to, and interconnection of, networks and services.

Local Networks Convergence in the United States

In the United States, two important questions in the ongoing debate on local networks convergence have been: (1) whether the ban on telephone/cable company cross-ownership contained in the *Cable Communications Policy Act of 1984* should be repealed; and (2) whether the Modified Final Judgment (MFJ) restriction on telephone companies' provision of information services should be ended. At the present time, the cross-ownership ban remains in effect, but Congress continues to give consideration to bills that include provisions that would end the ban. Judicial review of the MFJ restriction has put its continuing legal validity in serious question, but this will not be resolved conclusively until current appeals are exhausted.

An important contribution to the continuing discussion of convergence was the major public consultation on telecommunications infrastructure policy conducted between January 1990 and October 1991 by the National Telecommunications and Information Administration (NTIA) of the U.S. Department of Commerce. NTIA recommended that the 1984 cross-ownership ban be repealed and that local exchange carriers be allowed to provide video programming as long as they also offered video transmission capacity to unaffiliated program providers on a common carrier basis, without discrimination, and provided there were safeguards against cross-subsidization.[37] At the same time, NTIA called for removal by the Federal Communications Commission (FCC) and the states of existing legal barriers to competition in the local exchange services market.

The FCC has been on record since 1988 as recommending that Congress repeal the 1984 telephone/cable cross-ownership ban. In an October 1991 announcement, the FCC referred again to this recommendation and, at the same time, called for public comments on a proposed video dialtone policy. Comments filed by the deadline of January 23, 1992, in essence, indicated that the telephone industry thought the FCC's proposed video dialtone policy did not go far enough. In this industry's view, the policy was too prescriptive and restrictive. Others, such as the cable industry, believed the Commission's video dialtone proposal went too far. Cable operators were concerned that the proposed safeguards against anti-competitive practices by the telephone companies would prove to be inadequate.

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[37] U.S. Department of Commerce, National Telecommunications and Information Administration, *The NTIA Infrastructure Report: Telecommunications in the Age of Information* (October 1991), NTIA Special Publication 91-26.

On July 16, 1992, the FCC announced that it was modifying its rules, enabling local telephone companies (local exchange carriers, or LECs) to provide a video dialtone service. In addition, the Commission recommended that Congress repeal the telephone company-cable cross-ownership prohibition and proposed expanding the rural area exemption. The action by the Commission (Docket 87-266) adopted at its July 16 meeting also permits LEC ownership (to a maximum of 5%) in video programmers.

With the modified rules, the LECs will be permitted to act as carriers for video programming provided by others, subject to current rules for enhanced telephone services. The amendment to the rural exemption in its cross-ownership rules will permit LECs to provide video programming directly to areas with a population of less than 10,000. The *Cable Act of 1984* authorized the Commission to define areas for such exemption, and previously the rules had defined rural areas as being communities of under 2500.

The Commission will prohibit LECs from purchasing existing broadband cable television facilities in their service areas in order to provide video dialtone service. However, telephone company acquisition of existing broadband facilities for leaseback purposes would still be permitted. The FCC proposes to review the modified rules in three years time.

A significant theme in the convergence debate has been the notion that the United States needs to rise to the challenge of competitiveness posed by the plans of Japan's major carrier, Nippon Telegraph and Telephone Public Corporation (NTT), to build a fibre optic network throughout Japan by the year 2015. The proposed *Communications Competitiveness and Infrastructure Modernization Act of 1991* introduced in Congress in June 1991 and still under consideration is designed as a way of meeting the challenge.

Another legislative proposal, introduced in Congress in the fall of 1991, called for a *Telecommunications Act of 1991*. It too is still under study. This Bill can be seen as a response in Congress to the possibility that the courts will, once and for all, render the MFJ restriction on telephone companies' provision of information services invalid. The Bill would impose a "bottleneck test" of local exchange competition that would have to be met before Bell Regional Holding Companies could enter the information services market in their area.

Local Network Convergence in Other Countries

In Japan, local networks convergence is far less of an issue than in Canada or the United States. This is because direct broadcasting satellites are likely to be the preferred method of delivery of new television programming over at least the next decade and because cable television is far less developed than in North America. In addition, as noted in the description of local networks convergence in the United States, NTT has announced it has plans to build a fibre optic network, beginning in 1995, with nationwide coverage by the year 2015.[38] A viable cable television industry may never evolve as a result of this process. However, recent statements from NTT indicate that, due to the current economy and uncertain customer demand, the company now considers the goal of completing a fibre network by 2015 as no longer realistic.

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[38] Michael Galbraith, "Japan thinks big on the fiber front," *Telephony* (May 6, 1991).

The approach to local networks convergence differs yet again in Europe. In the past, comparative policy information from within Europe has usually been derived from individual member states. With the arrival of 1992, however, it becomes more appropriate to examine European policies within the framework of a united Europe. On February 7, 1992, the member states of the European Community reconfirmed their desire for a cohesive economic, social and foreign policy union in the Treaty on European Union, signed in Maastricht. Dealing specifically with telecommunications, Title XII reiterates the goal of common trans-European networks, including provisions "to cooperate with third countries to promote projects of mutual interest and to ensure the inter-operability of the networks" (Art. 129d).

Although a specific convergence directive or resolution has not been issued by the European Commission, the Group for Analysis and Forecasting (GAP) has identified the need for "joint provision of video communications and TV distribution via a single local network if acceptable tariff levels are to be reached.[39] As well, the EC's RACE program encourages the development of broadband capability that will integrate two-way narrowband telephone and data and one-way broadband television.

Television, film and video companies are interested in the role of European telecommunications in cable television and ISDN technology. There are no regulations in place that would apply a pan-European approach to convergence. In the absence of a general policy, telecommunications regulations take priority over broadcast regulations. The relationship between the telecommunications and cable television sectors varies significantly between countries.

Generally speaking, Articles 85 and 86 of the Treaty of Rome give the European Commission the power to curb monopoly organizations, and issue directives which are binding on member states without their prior consultation. In the area of the media, with growing numbers of mergers and acquisitions, the Commission wants pre-emptive powers to regulate media mergers. The Commission has proposed a new "Regulation on the Control of Concentration between Undertakings" which would give it the power to intervene where:

- the undertakings involved have a combined turnover initially set at 5,000 million European Currency Units (approximately U.S.$6.18 billion); and,
- two-thirds of the combined group's sales are in one member state.

The Commission will allow monopolistic or apparently anti-competitive mergers if their economic benefits outweigh the damage to competition. The Commission is promoting media concentration and convergence in order to create strong European firms able to compete internationally with the U.S., Japanese or other foreign entities.[40] One could surmise therefore that there is an indirect effort to create a fortified European communications industry and that the interest in permitting mergers in the media sector would imply a green light for broadcast/telephone company convergence provided that it is in accordance with Articles 85 and 86 of the base Treaty and does not encourage a dominant market position.

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[39] Proposals by GAP for the coordinated introduction of broadband communications in the Community, 1986, cited by Herbert Unger, *Telecommunications in Europe* (Brussels: Commission of the European Communities, 1990), p. 76.

The U.K. approach is unique and differs from the EC position. The U.K. has a substantially more liberalized and competitive telecommunications sector than most of the rest of Europe, as well as an industrial strategy which strongly supports the development of cable television.

Compared to North America, cable television in the U.K. is highly underdeveloped. The first cable licences were awarded in 1983 but initial progress was very slow. By January 1988, there were only about 40,000 subscribers to "broadband" cable service. In 1988, interest revived when the Cable Authority gave the option to cable companies of also applying for telecommunications licences from the Department of Trade and Industry. By year-end 1991, a total of 133 cable franchises had been awarded of which 44 had launched cable service. During the last four years, substantial progress in construction was achieved with over one million homes cabled by January 1992 with an average penetration of 20%.

Cable telephony increased from 5,000 subscribers in April 1991 to reach nearly 25,000 by the end of 1991. Dixon, Goodwin & Co. estimates that there will be in the order of two million residential access lines served by cable operators by the turn of the century and nearly half a million business lines.[41]

While the RACE Program of the European Community is still exploratory and developmental in nature, U.K. cable operators are confronted with the prospect of integration today. They are encouraged by the Government to provide the full range of telecommunications services in competition with British Telecom and, to be competitive, must do so in the most cost effective manner.

As it stands, U.K. cable operators do not carry television and telephone signals down the same fibre or down the same piece of coaxial cable. Operators, many of which involve large U.S. telephone companies, consider that the equipment to integrate services economically is not available yet. One U.S. telephone company affiliate, NYNEX UK Telephone and Cable TV Company, the parent company of which is heavily involved in fibre distribution networks in the U.S., has expressed serious doubt about the compatibility of the point-to-multipoint television network with the point-to-point telephone network. A NYNEX UK spokesman has expressed the view that savings will be derived from being able to use common ductwork, common fibre bundles, integrated management information systems, Siamese drop cable and an integrated work force. He further stated that there may be further economic savings or product benefits to be gained by the final integration of the separate signals on to a single cable, but he was unaware that the viability of such integration had been demonstrated.[42]

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[40] Michael Foster and John Howkins, *Television in 1992: A guide to Europe's New TV, Film and Video Business* (London: Coopers and Lybrand, 1989), p. 53.

[41] The Cable TV and Telecom Yearbook 1992, Who's Who in Cable and Satellite . . .

At present, British Telecom is prevented from offering entertainment television services over its access network. The Government White Paper of March 1991, which is intended to precede a new Telecommunications Act, proposes that British Telecom should be barred from distributing television signals for a period of ten years with the possibility of a review after seven. The rationale behind this ruling has been that it will give the nascent cable television industry in the U.K. time to establish itself.[43] This restriction is controversial and has been criticized as running counter to other pro-competitive measures in the Act.

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[42] Nicholas Mearing-Smith, Executive Group Director, NYNEX UK Telephone and Cable TV Company, The Third Economist Telecommunications Conference, London, September 1991.

[43] Organisation for Economic Co-operation and Development, *Convergence Between Communications Technologies: A Policy Review, Annex 1: Country Analysis*, p. 135.

CHAPTER 3

THE EFFICIENCY OF THE INFRASTRUCTURE

3.0 THE EFFICIENCY OF THE INFRASTRUCTURE

3.1 Economies of Scope

Some of the most fundamental issues underlying current discussions about the future of the local network infrastructure relate to the question of whether it would be more efficient in the long run to have a single local telecommunications network infrastructure.

This question has implications for a wide variety of policy issues. For example, should Canadian policy and regulation permit telephone companies to enter video markets such as the television program distribution market? Should cable operators be able to expand their entry into voice and data markets? Should other network operators be authorized to construct facilities to serve local telecommunications markets? In each of these cases, if entry is permitted, under what conditions should it occur?

In Canada, as in most of the world today, telecommunications policies and regulatory approaches are placing increasing reliance on market forces. Restrictions on competition are generally adopted only where it is assumed that market forces alone will fail to produce an efficient competitive market place or to achieve an important policy objective.

The development of an economically efficient local network infrastructure is undoubtedly an important policy objective for Canada. Therefore, a case could be made for regulatory intervention to limit the construction of competitive facilities and to promote the evolution towards a single integrated network if there was clear evidence that such intervention would provide the Canadian public with a local telecommunications infrastructure that could deliver the various services carried on the telephone and cable networks more efficiently. In other words, other things being equal, such regulatory intervention could be justified by clear evidence of the existence of economies of scope.[44]

In the course of its research and deliberations, the Committee's review of the issue of economies of scope was generally limited to the question of whether it would be more efficient to provide interactive voice, data and video services of the type offered by telephone companies over the same network as video program distribution services of the type offered by cable operators. It was neither necessary nor possible to conduct a thorough investigation into the existence of economies of scope in the provision of all types of voice, data and video distribution services. Instead, the questions considered by the Committee related to the integration of the *core* services of the cable and telephone industries onto a single network.

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[44] Generally speaking, economies of scope can be said to exist when the production of a combination of two or more distinct products or services by a single firm or facility results in lower cost than the separate production of each product or service by different firms or facilities. Economies of scope can result from the sharing of facilities, labour or management between two or more products or services.

3.2 The Evidence on Economies of Scope

There was a general consensus among Committee members that there is no evidence that significant economies of scope would result from the integration of interactive voice, data and video services of the type offered by telephone companies over the same networks as the video program distribution services offered by cable operators. More specifically,

- Committee members were not able to point to any studies or other empirical evidence that conclusively indicate that scope economies exist in the joint provision of voice, data and video program distribution services over integrated networks; and

- the limited *ad hoc* evidence on scope economies in the provision of voice, data and video services over integrated networks is insufficient to support the implementation of a single integrated services network policy.

A number of studies of potential economies of scope in the integrated provision of voice, data and video services were recently canvassed by the United States National Telecommunications and Information Administration (NTIA) in *The NTIA Infrastructure Report*.[45] This report, which was the culmination of a comprehensive 20 month study, concluded that the debate over the efficiencies associated with integrated transmission of voice, data and video was not conclusive.[46] However, the NTIA report indicated that "such integration does appear to present design and engineering issues that will have to be carefully handled if potential economies of scope are to be realized".

NTIA's report goes on to suggest that the fact that controversy exists over the extent of possible scope economies does not justify prohibitions by government that would prevent a firm from discovering in the market place the efficiencies it could realize from an integrated network. NTIA notes that it is precisely in these areas, where there are substantial differences of opinion among industry participants on the direction in which technology will drive the market place, that governments, as a general matter, should not be intervening to favour one approach over another. "Rather," it concluded, "government-imposed barriers to investment in new technological approaches should be carefully avoided in the absence of clear evidence of market failure or other strong public policy rationale."[47]

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[45] NTIA, *The NTIA Infrastructure Report: Telecommunications in the Age of Information*, (U.S. Department of Commerce, Washington, D.C., October, 1991). This report concluded an extensive NTIA study of the current state and future development of the U.S. telecommunications infrastructure, and recommended a generally deregulated pro-competitive policy environment.

[46] *Id.*, at pp. 229-30. The report suggests that studies relied on by U.S. telephone companies (e.g. by Neal Stolleman, NERA) tended to find that there were potentially substantial economies of scope in integrated service distribution, while other studies relied on by cable companies (e.g. by Hatfield Associates, Johnson and Reed) did not find economies of scope (see pp. 227-230 of NTIA Report). Other research by Bruce L. Egan, notes that there are many possible tradeoffs in broadband network design and construction which serves to complicate "costing out" each physical network alternative in a business case analysis, thus making research into economies of scope highly reliant on design and construction assumptions.

While the evidence on the existence of economies of scope in the provisioning of voice, data and video program services over a single network is generally inconclusive, there appear to be economies of scope in specific elements of local networks. For example:

- joint provision of voice, low-rate data and similar interactive services on the public switched telephone network; and
- joint provision of various tiers of cable services on cable networks, including basic, extended basic, and pay/specialty video program distribution services.

And, more significant for the purposes of this report,

- joint use of some elements of local network infrastructures as between the telephone and cable industries, such as:
    - support structures for local distribution wire and cable, such as poles and conduits, as well as related rights-of-way and associated trenching and other installation functions; and
    - administrative and maintenance resources, including personnel, vehicles and other equipment, office and maintenance space, and similar resources in rural and remote areas.

This list is by no means exhaustive. The opportunities for potential economies of scope in other elements of the local network infrastructure are discussed in more detail in Chapters 4 and 5 of this report.

While submissions to and by Committee members and a search of the literature brought forward no reliable evidence on the existence of economies of scope in an integrated network, it is certainly possible that in the longer run, integrated local networks may exhibit significant economies. It is expected that the local telephone and cable networks will remain different enough that it will not become more efficient to distribute the core services of the two industries over a single network in the foreseeable future. However, given the present rate of technological evolution, it is certainly possible that both networks would be capable of offering a largely similar set of digital voice, data and video services on a ubiquitous basis by the 2020-2030 time frame.

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[47] *Id.*, at p. 230.

To summarize, there is no conclusive evidence that there would be economies of scope in the overall integration of telephone and cable services. However, it is likely that economies of scope will continue to develop in specific elements of the local network infrastructure.

In Canada, as in other countries, there have been proponents of two fundamentally different types of public policy approaches to guide the future evolution of the local network infrastructure:

(1) Policies which actively promote the integration of existing and future telephone, cable and other wireline telecommunications services onto a single network, operated by a single industry; and

(2) Policies which rely primarily on market forces, leaving it to individual cable operators, telephone companies and other service providers to determine the degree of network integration that occurs.

The first approach would be more attractive if there was clear evidence to indicate that substantial economies of scope will emerge through the use of an integrated network, particularly in the short term. However, particularly in the Canadian environment, where well developed and separate cable and telephone networks already exist, a policy approach which actively promotes a single integrated network, and which restricts the diversity of suppliers and technologies employed, carries with it significant risks of making incorrect technological, service and investment decisions. Such a policy approach would not be warranted in the absence of clear evidence that it would produce a more efficient local network infrastructure.

A predominantly market-driven approach that permits network operators to determine the degree of integration that should occur will, if properly crafted, result in a lesser degree of risk and a greater range of benefits for Canada than the first approach. In general, the better approach would see a flexible policy and regulatory environment which permits a competitive local network environment yet encourages the integration of local network elements where specific benefits, such as increased efficiency or service capabilities, can be demonstrated.

Under this latter approach the continued existence of two separate local network suppliers with an increasing ability to provide competitive services will benefit consumers by stimulating service and technical innovation, promoting efficiency gains, curtailing price increases and providing a more customer-responsive environment.

3.3 Other Factors Affecting Network Integration Policies

Policies affecting the integration of local networks should be considered within the broader context of the present and future structure of local telecommunications markets. Even if there was clear evidence of economies of scope, policies governing the degree of competition and integration should take into account other factors not directly related to the costs of providing service.

Some of the more significant factors that should be taken into account in the development of network integration policies are discussed in this section.

The choice of policy and regulatory approaches should take into account the uncertainties of technological evolution. In this regard, it is noted that there have been a number of advocates of a policy of accelerating the deployment of a ubiquitous fibre optic network which would permit integrated delivery of all types of voice, data and video services. However, while an integrated, fibre-based local network may theoretically achieve significant economies of scope over the long run, technology trends may well delay the achievement of such economies.

For example, evolving technologies are likely to permit digital video compression and interactive voice transmission over both existing cable coaxial drops and telephone loops on a cost-effective basis. These technologies will likely provide more efficient alternatives than a single ubiquitous fibre-to-the-home network, for quite some time into the future.

As a result, a policy which supported the accelerated deployment of a fibre-to-the-home network could well result in the costly and premature duplication of the functions of the two existing networks by a "third" local network. Instead of achieving savings from the integration of services over a single network, the result of accelerated deployment of fibre-to-the-home could be the premature provisioning of an uneconomic "third" distribution network. Moreover, in the absence of evident demand for new services that require fibre-to-the-home capabilities, the costs of fibre-to-the-home deployment would likely be paid by local telephone or cable subscribers.

Various factors will influence the development of market demand for local telecommunications services. For example, in the residential video program distribution market, competition from other media will alert consumers to new service alternatives. In addition to video stores, and possibly MDS systems, high powered Direct Broadcast Satellites are expected to be offering a variety of video programs to the home in competition with the cable industry. For the cable operator, the best response to this new competitive threat is to provide more and better choices of programming and better service at a competitive price. This will require deeper penetration of fibre, larger cable bandwidth, digital compression, more sophisticated programming arrangements at the cable head end and possibly high definition television capabilities.

It is highly unlikely that the telephone network will be able to be a cost-effective competitor in the video program distribution market served by cable, video stores and DBS for at least a decade, and probably longer. However, significant new demand for residential broadband services will emerge from the trend to migrate work and educational activities from the office to the home. This will require more data transmission, higher bit rates and video conferencing capabilities. Additional impetus for upgrading the local telephone market will come from the development of an increasingly attractive array of multimedia services, in which voice, data and video are combined into single applications.

These developments, among others, will drive the upgrading of the telephone network to broadband capabilities. As a result of the evolutionary process of upgrading the local telephone distribution network to take account of these developments, the network will become increasingly capable of offering video entertainment and information services, and thus, in the longer run, may become capable of competing with other video program distribution media such as cable.

One of the major factors supporting the existence of separate telephone and cable networks for at least another decade is that the technological solutions required for cost-effective network integration are not yet available. Even when such solutions emerge, it will take time to implement them because:

a) the two separate networks have been engineered for different types of services with fundamentally different network architectures and capabilities; and

b) the large scale and widespread nature of local distribution networks makes their replacement a very long and expensive process.

Over the longer term, if large scale local network integration does becomes technologically and economically viable, the two networks may not be able to survive side by side, unless there is a strong demand for diversity of access and service providers.

There will then be several possible scenarios for evolution toward a single network. In one, the industry which develops the most efficient network and provides the most attractive services will gain market share and become the sole provider of the integrated local network infrastructure, and the other one will disappear. Another scenario would see the telephone and cable industries cooperating to take advantage of the economies of scope promised by new technologies and progressively integrating their networks.

Until clearer evidence emerges on the nature and impact of the technologies that will permit network integration, it would be premature to assume a particular form of network evolution. Such evidence will emerge gradually over the next decades to come, leaving sufficient time to re-evaluate the evolution of the local network environment and decide whether government intervention is warranted to prevent a failure of the market place to provide an efficient local network infrastructure.

3.4 Conclusions

It is not possible to distribute voice, data and video program distribution services over a single local network on a cost-effective basis today. There is no conclusive empirical evidence as to whether or when it may become possible to do so. Predictions regarding future economies of scope in the joint distribution of such services over a single network are highly dependent on assumptions as to network design. Such predictions also depend on the technological capabilities and cost-effectiveness of future developments in local network technologies.

It is not possible to predict the rate of development and cost implications of the key technological changes that will determine the most efficient infrastructure over the long run. Therefore government policy and regulation should not, in general, be premised on a particular preconceived form of network evolution.

In the current Canadian environment which is characterized by separate and well developed local telephone and cable networks, there is no evidence that it would be more efficient to integrate, onto a single infrastructure, the distribution of the core services delivered by the two networks, namely interactive voice/data/image communications and television program distribution.

Utilizing today's technologies, such as fibre optic cable, digital transmission, switching and compression, it would be significantly more costly to integrate the telephone and cable networks, or to upgrade one to perform the functions of both, than to maintain and upgrade the two separate networks.

RECOMMENDATION

1. **In the absence of evidence that there would be overall economies of scope in the joint provision of telephone and cable services over a single local network infrastructure, government policy and regulation should not promote the full integration of local network infrastructures.**

Although there is no evidence of overall economies of scope, there are certain areas where efficiencies could be realized through greater integration, interconnection and cooperation between telephone and cable network operators. Some of these areas are discussed further in Chapters 4 and 5 of this report. In addition, as both networks incorporate more similar technologies and topologies (i.e. digital transmission, fibre optics, video compression, video switching capabilities, ring structures), the opportunities for economies of integration will increase.

It is not possible to predict or prescribe where or how these economies of integration can best be developed, particularly over the longer term. In general, local network operators should develop and adopt more efficient technologies and approaches in a competitive market, within a flexible regulatory environment.

Regulation of the two major local network operators will continue to be required for some time, primarily due to the monopoly position and market power of the network operators in their core markets and their control over bottleneck facilities. In addition, the achievement of social policy and cultural objectives such as those set out in the *Broadcasting Act*, will also continue to require some degree of regulatory oversight.

It should become an increasing focus of regulation to support the development of more efficient local networks. Regulation should promote the implementation of technologies and approaches that provide services over integrated elements of local networks, that interconnect local networks and that foster cooperative ventures between telephone companies and cable operators when and where such integration, interconnection or cooperation proves to be more efficient. However, such regulation should also ensure that these developments are introduced in a manner that is generally consistent with the maintenance of a competitive local network infrastructure and with the objectives of Canadian communications policy which are discussed in Chapter 1.

Given the market power of each of the two main local network operators, and their control over bottleneck facilities, regulatory intervention may be required in some cases to implement initiatives that promote greater network efficiency or that promote other objectives of Canadian communications policy. Historical examples of such intervention include the CRTC's decisions to require mandatory access to support structures or transmission facilities, and mandatory distribution and support of a reasonable level of Canadian information content.

Competitive developments in Canada and abroad dictate that local network operators, government and regulators should cooperate to develop more efficient and capable local networks. Canadian firms could play a leading role in developing new local network technologies and approaches that integrate various network elements or services and that interconnect the facilities of telephone companies and cable operators. If they are developed early, such "integration" technologies could be exportable to other countries, both developed and developing, that will be searching for cost-effective means of extending their own voice, data and video services.

Finally, the uncertainties of technical and market evolution will continue to make it difficult to develop local network policies that stand the test of time. The better approaches, from the perspective of both the policy maker and the regulator, are flexible ones, that are reviewed periodically to determine whether they are consistent with the current evolution of local network technologies and the evolution of the market place.

In view of the dynamic nature of the technology and markets, it would be useful to establish a periodic review requirement for all regulations and policies that affect the evolution of the local network infrastructure, and particularly those that restrict the functioning of the market place.

RECOMMENDATIONS

2. **Government policy and regulation should not prevent the sharing and integration of different elements of the local cable and telephone infrastructure, as and when such integration is more efficient than the use of separate facilities.**

3. **Since it is not possible to predict or prescribe where or how all of the economies of integration will occur, the policy and regulatory environment should be flexible enough to permit local network operators to implement cost-effective means of integrating elements of their infrastructures. Such arrangements should be implemented in a manner that is consistent with the development of a more efficient local network market place and with the other objectives of Canadian communications policy.**

4. **In view of the changing technological and market environment of the local network infrastructure, government policies and regulation which affect the evolution of that infrastructure should be reviewed on a periodic basis, to determine whether they are still appropriate, and in particular, whether they unnecessarily restrict the development of the market place.**

5. **Regulatory supervision should continue to ensure that increasing competition and anti-competitive strategies do not cause either cable operators or telephone companies to refuse to implement approaches to network integration, interconnection or cooperation that would improve the efficiency of the local network infrastructure.**

CHAPTER 4

OWNERSHIP OF THE LOCAL NETWORK INFRASTRUCTURE

4.0 OWNERSHIP OF THE LOCAL NETWORK INFRASTRUCTURE

4.1 Sharing Elements of the Network Infrastructure

The previous chapters of the report have indicated that it is not clear that efficiencies will be gained, and indeed that some of the benefits of competition will be lost, through the overall integration of the local network infrastructures used to provide telephone and cable services. Nevertheless, opportunities exist today, and will expand in the future, to increase local network efficiency through cooperation between the cable and telephone industries and through sharing or integration of specific elements of the network infrastructure.

The most evident opportunities exist in relation to the elements of the network infrastructure set out below. The issues, findings and recommendations relevant to these network infrastructure elements are discussed in the indicated sections of this chapter.

	Section
● support structures	4.3
● rights-of-way	4.4
● subscriber drops	4.6
● cable amplifiers	4.7
● cable head ends	4.8
● scope clause	4.9

4.2 Less Densely Populated Areas

Early in the work of the Committee, it was suggested that there might be some merit in encouraging telephone companies to establish new cable systems in unserved areas, as a means of extending cable service to the relatively small population of Canada living in remote and small communities that remains unserved by cable today. However, during the deliberations of the Committee, telephone company representatives indicated that they do not consider that they have the capability to serve remote areas more efficiently than cable operators.

In fact cable operators like Regional Cablesystems Inc., which specialize in serving small remote communities, have developed a unique ability to provide service to such communities on a cost-effective basis, when larger cable operators and other potential service providers have found it uneconomical to do so. Telephone company representatives appeared to agree with this view and expressed no particular desire to be permitted to serve the remote and small communities that are not served by cable today.

However, the situation may well be different in the case of joint telephone/cable initiatives. In considering the issues and recommendations relevant to each of the network elements listed above, the different characteristics of urban centres and less densely populated regions should be kept in mind. There appears to be a greater potential for efficiency gains through sharing and integration of network infrastructure elements in less densely populated areas than in urban centres. Further, in less densely populated areas there would appear to be opportunities for savings through the joint operation and maintenance of some aspects of the local network infrastructure.

The potential for such savings through joint operation and maintenance was discussed between the co-chairs and Committee members and other telephone and cable representatives with experience in serving more remote or less densely populated areas. Questions asked included whether it would be more efficient for one maintenance truck and one technician rather than two to make the long trip to a remote community to install, maintain, repair or upgrade both telephone and cable services. Other questions dealt with potential savings in joint billing, subscriber records maintenance, and a variety of other administrative functions. While such cooperative ventures may not produce any savings, and indeed might raise some competitive concerns in urban markets, most industry representatives with direct experience indicated that they were worth pursuing in remote areas.

When asked why cooperative operation and maintenance ventures had not taken place to any significant degree to date, industry respondents cited reasons such as "traditional industry mindsets", union issues, or "we never thought of it before". It was generally acknowledged that this area of cooperation merits further investigation and experimentation.

Joint operation and maintenance ventures could benefit telephone and cable operators as well as their subscribers. Potential benefits include increased efficiency in high-service-cost areas, increased competitiveness of cable services vis-à-vis DBS,[48] and potential savings to cable and telephone subscribers in remote areas where incomes tend to be lower than those in urban markets. Employees of both industries could also benefit from the new, more varied, and more sophisticated job experience, which should be reflected in applicable compensation agreements.

RECOMMENDATION

6. Since the potential for increased efficiency and improved service will often be greater in less densely populated areas,

(a) cable operators and telephone companies serving such areas, in particular, should pursue opportunities for increased efficiency or better service through sharing and integration of elements of the local network infrastructure; and

(b) cable operators and telephone companies serving such areas should, in consultation with their employees and their unions, pursue

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[48] See section 5.1 for a further discussion of Direct Broadcast Satellites (DBS).

opportunities for increased efficiency through shared or integrated administration, maintenance and similar functions related to the ongoing operation of their networks.

4.3 Support Structures

Background

Government policy, regulation and industry practice have long recognized that there are good economic, environmental and aesthetic reasons for sharing support structures between the telephone and cable industries, as well as other users of support structures, notably electrical power utilities. Regulatory intervention was required in the early days of the cable industry to order telephone companies to make their support structures available to cable operators on reasonable terms. However, the telephone industry now generally perceives it to be in the interests of the general public to make telephone company support structures available for the cable industry's transmission facilities.

Today, through a combination of regulation, industry agreement, and informal arrangements, there are a variety of procedures in place dealing with the shared use of support structures. At the federal regulatory level, CRTC decisions[49] establish the rules under which cable operators can access telephone company support structures such as poles and conduits on a regulated tariff basis. In addition, telephone companies have entered into agreements with electric utility companies to ensure that support structures are efficiently shared in the provision of electrical power and telephone services. Support structures subject to such agreements are frequently also made available to cable operators.

Unlike telephone companies and electrical utilities, cable operators do not generally have a legal right of access to public rights-of-way for the purposes of installing support structures or transmission facilities. This factor is discussed further in the next section. As a result of this factor and since many telephone and electrical support structures were in place before the emergence of the cable industry, cable operators today own relatively few of the support structures used for their own transmission facilities.

Committee members acknowledged the value of the cooperative approaches that have been developed to date to permit the sharing of support structures. Since a major portion of local network cost is related to support structures, there was agreement among Committee members that building duplicate support structures would not generally be economically efficient. It was also recognized by the Committee that duplicating aerial support structures could have adverse environmental and aesthetic impacts.

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[49] Principally Telecom Decisions CRTC 77-6, relating to conditions of use of support structures, and Telecom Decision 86-16, relating to rates.

There are exceptions to the above conclusions. The duplication of underground conduits has little or no adverse environmental impact. In the case of underground conduits, there are situations where appropriate support structures are fully utilized and new separate support structures may be the only alternative. In other situations, the design of cable networks may require support structures where no telephone company structures are required.

While there is already a substantial amount of sharing of support structures in Canada, there was consensus among Committee members that there is room for further improvement, for example, in the joint planning of support structures. Moreover, there are concerns that increasing competition between the cable and telephone industries may diminish the level of cooperation in the sharing of support structures.

Conclusions

The area of support structures has shown the greatest potential for cost reductions through sharing of telephone company and cable facilities, and it will continue to do so. Shared use of support structures and rights-of-way is not only more efficient in most circumstances, but is also environmentally less damaging than the duplication of infrastructures. This is particularly true in the case of pole lines.

Regulatory supervision will be required to ensure that increasing competition between telephone companies and cable operators does not lead to a deterioration of the level of sharing of support structures or other infrastructure elements, in circumstances where it is efficient to do so. Regulators should be prepared to mediate, if complaints are filed, to ensure efficient and environmentally sound use of support structures.

Joint-use arrangements between power utilities, telephone companies and cable operators have successfully precluded the construction of duplicate infrastructures in many areas. However, these arrangements generally fall short of ensuring an adequate degree of coordination at the planning phase of the construction of new infrastructures. This is particularly so in the case of cable operators, who tend to be treated as the junior partner in such arrangements. Better coordination in the planning of conduits and pole lines would generally improve the efficiency of the local network infrastructure. It could also eliminate costly and disruptive rearrangements and unnecessary construction at a later date.

The sharing of support structures between the telephone and cable operator has traditionally involved arrangements under which a telephone company or power utility owns the structure and leases a portion of space or capacity to the cable operator. While this approach has served its purpose reasonably well, in the future, more extensive and innovative joint ventures would be likely to produce greater efficiencies from the perspective of support structure providers and their customers. Such joint ventures include:

- cooperation in the deployment of new fibre cables, for example, by treating the sheath and some of the electronics of a fibre cable as support structures, and sharing the transmission capacity (e.g. through fibre cable condominium arrangements);

- conduit structure condominium or other joint ownership arrangements; and

- creation of jointly-owned support structure utilities.

Joint use of support structures and joint infrastructure ventures generally should be encouraged where they will result in more efficient operations, taking all factors into account. The identification of where and how such efficiencies can be achieved is not always obvious. Even when it will appear obvious to a telephone or cable engineer, there will be implementation challenges to overcome. Experimentation and innovation will be required.

RECOMMENDATIONS

7. **Canadian policy and regulation should continue to promote the sharing of support structures by telephone companies, cable operators and other support structure providers. In this regard, the concept of support structures should be defined more broadly in the future, taking into account new technologies such as fibre optic cables, for which sharing arrangements can improve the efficiency of the local network infrastructure.**

8. **Government policy and regulation should not prevent the development of joint ventures between telephone companies and cable operators that are aimed at achieving more effective and efficient sharing of support structures.**

9. **Telephone companies and cable operators should, in conjunction with electrical power utilities, and other providers of support structures, establish better cooperative mechanisms to plan the shared construction and use of support structures. Where necessary, regulators should intervene to ensure that such cooperative mechanisms are developed and implemented and that they function effectively.**

4.4 Rights-of-way

Unlike telephone companies, electrical utilities and most other public utilities, cable operators generally do not have a legal right of access to public rights-of-way for the purposes of installing their transmission lines and associated support structures. The Committee considered the question of whether it would be appropriate to establish such a right.

Cable industry representatives advocated the establishment of a statutory right of access to public rights-of-way similar to that enjoyed by federally regulated telephone companies. It was suggested that the existence of this right would provide a more satisfactory basis for negotiation of cooperative approaches to the use of support structures. Cable operators are often dependent on telephone companies with respect to the location, type, timing, maintenance and other conditions of support structure provision.

Better cooperation and fairer joint use arrangements would be achieved, according to cable representatives, if the two industries negotiated from a more equal bargaining position. It was also noted that sometimes cable and telephone companies operating in the same service areas utilize different routes for their distribution plant. This makes it difficult or impossible for cable operators to rely entirely on telephone company or electrical utility support structures.

Representatives of the cable industry submitted that in circumstances where they were unable to obtain access to the support structures of telecommunications carriers, electric power utilities or other providers of support structures on reasonable terms and conditions, cable operators should have the same legal right of access to public rights-of-way as federally regulated telecommunications common carriers.

Some telephone representatives on the Committee expressed concerns that a right of access to rights-of-way by cable operators would lead to inefficient use of facilities through duplication of support structures. They indicated that a preferable approach would be to improve the level of consultation between telephone companies and cable operators in the planning of telephone company support structures.

In response to concerns about the unnecessary duplication of support structures, the cable industry agreed that a right of access on its part to public rights-of-way should only arise if suitable support structures were not available on reasonable terms. A similar approach, it was noted, has been used for many years by the Department of Communications regarding certain categories of radio spectrum licensing. Before private users are able to obtain radio spectrum licences for certain types of private microwave systems, they must approach the telecommunications common carriers to determine if facilities are available on reasonable terms and conditions. A similar approach could be used in the case of cable operators' access to rights-of-way.

In order to prevent unnecessary duplication of support structures, as well as potential environmental disruption and aesthetic problems, government policy and regulation should continue to require cable operators to negotiate with other potential suppliers of support structures to obtain suitable facilities. However, where such negotiations are unsuccessful, it would be reasonable to grant cable operators similar rights of access to public rights-of-way as telephone companies. At the federal level, these rights, which are currently set out in the *Railway Act*, are proposed to be simplified and updated by means of clauses 48 and 49 of *Bill C-62*.

The language of *Bill C-62* appears to strike a reasonable balance between the legitimate rights of municipalities and federal communications undertakings such as telephone companies and cable operators. Clause 48 provides that the entry of such federal undertakings onto rights-of-way "shall not unduly interfere with the public use and enjoyment of the highway or other public place" and that the relevant work should not be done "without the consent of any municipality having jurisdiction over the highway or other public place".

Clause 48 goes on to provide, however, that where the federal undertaking cannot obtain a municipality's consent to construct a transmission line on acceptable terms, the undertaking may apply to the CRTC for permission to construct it and the Commission may grant permission subject to any conditions that the Commission deems appropriate. Clause 49 further permits municipalities to apply to the Commission for orders or prohibitions regarding such activities.

RECOMMENDATION

10. Cable operators should have the same rights of access to public rights-of-way as federally regulated telephone companies in circumstances where suitable support structures are not available to them on reasonable terms and conditions from telephone companies, electric power utilities or other providers of support structures.

4.5 The CRTC Cable Plant Ownership Rule

The CRTC has, since 1970, required cable television licensees to own certain key components of their distribution plant. This requirement is currently set out in section 4 of the CRTC *Cable Television Regulations, 1986,*[50] which reads:

> 4. Except as otherwise provided pursuant to a condition of its licence, a licensee shall own and operate its local head end, amplifiers and subscriber drops.

This rule has traditionally been seen as a means of ensuring CRTC regulatory control over licensed cable undertakings. In the early days of the cable industry, it was also seen as a means of ensuring that cable investors had a sufficient stake in their undertakings to ensure a long-term commitment to compliance with CRTC regulations, policies and licence conditions. While the CRTC may, upon application by a licensee, modify this rule, few exceptions have been made to date.

The effect of the rule is to prevent cable licensees from leasing head end, amplifier and drop facilities from other parties, including telecommunications carriers.

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[50] SOR/86-831, August 1, 1986.

The cable plant ownership rule raised some of the most significant issues considered by the Committee. Members of the Committee debated whether the rule acts as a disincentive to greater sharing of facilities between telephone companies and cable operators, and thus to more efficient local networks. The question was raised whether, in today's environment, the rule had outlived its original purposes.

Committee members were divided on these issues. Representatives of telephone companies generally suggested that the current rule unnecessarily restricts cooperative sharing of facilities and prevents them from constructing and leasing subscriber drop facilities and even complete cable distribution systems to cable operators, in situations where that would be mutually advantageous. Some telephone company representatives indicated that such arrangements could provide them with new business opportunities in the transmission area and free cable operators of substantial capital commitments, allowing them to focus on the role of program distribution rather than signal carriage.

In order to meet the competitive challenges that high powered DBS satellites will pose for the cable industry, it will have to upgrade its systems to carry more than 100 channels equipped with addressable technology. Some cable operators, particularly smaller ones, may find it difficult to upgrade their systems quickly enough to meet the challenges of an increasingly diverse and competitive video program-distribution environment. Representatives of the telephone industry indicated that they could assist the cable industry to meet these challenges if they were allowed a greater degree of participation in the provision of local network facilities.

Most cable industry representatives expressed concerns about greater telephone company participation in the supply of cable transmission facilities. Some expressed the concern that the removal of the cable plant ownership rule would result in insufficient accountability by cable licensees to the CRTC. For example, they suggested that if cable operators no longer owned their subscriber drops, they would not, on their own, be able to upgrade channel capacity, improve service quality, or extend service to new customers, even if the Commission so directed.

Some cable operators also stated that control of their subscriber drops, amplifiers and head ends was seen as critical from a marketing point of view. They indicated that such control allowed them to maintain the quality of service necessary to build and retain their subscriber base. They indicated most customer complaints regarding quality of cable service relate to problems at the head end or subscriber drop.

Cable operators also raised a number of concerns about potential anti-competitive behaviour by telephone companies should the latter be permitted to own cable drops. The cable industry foresees increasing competition with the telephone companies in various non-programming markets. Accordingly, the cable industry expressed concerns that telephone companies might abuse their position as the provider of essential facilities to cable operators in order to achieve a competitive advantage.

For example, it was suggested that anti-competitive conditions could be placed on the use of telephone company facilities leased to cable operators. One example that was cited was that of a telephone company that is currently not regulated by the CRTC which prohibits cable operators from installing fibre optic plant on its support structures. Other examples of potential problems included the use by telephone companies of competitively-sensitive information about cable services obtained in the course of providing facilities to the cable operator. It was suggested that the incentive for anti-competitive behaviour will increase in proportion to the level of competition between the industries in the future. Regulation, it was said, was a cumbersome method of dealing with such abuses, and one that could not be fully effective.

The regulator's power to supervise the terms of the provision of facilities by telecommunications carriers to cable operators was recently strengthened in the 1991 *Broadcasting Act*.[51] Under section 9(1)(f) of the new Act, the CRTC may:

> (f) require any licensee to obtain the approval of the Commission before entering into any contract with a telecommunications common carrier for the distribution of programming directly to the public using the facilities of the common carrier;

This provision anticipated that in the future cable operators might lease a greater proportion of the plant in their systems from telecommunications carriers. In the clause by clause analysis prepared by the Department of Communications in August, 1988 to accompany *Bill C-136* (the 1991 *Broadcasting Act*), it was indicated that:

> At present, CRTC regulations require cable companies to own the crucial parts of their plant (the head end and the lines from the telephone pole into the home) but permit leasing of the remainder from the telephone companies, as long as these arrangements do not compromise the reliable delivery of broadcast services to cable subscribers. If the cable facilities were entirely leased from the phone companies, which under existing law have no authority to give priority to broadcasting services, the Commission would have no assurance that authorized cable system transmissions would in fact be delivered to subscribers' homes.
>
> New technologies such as fibre optics could lead to new types of plant arrangements based on cable sharing of telephone company fibre facilities. It could therefore be beneficial to adopt a technology neutral regulation which allows the Commission to regulate regardless of the technology chosen for delivery. The new Act will give the Commission explicit authority to regulate these new types of arrangements. To ensure that broadcasting objectives are accorded priority under any such new arrangement, a consequential amendment to the *Railway Act* is included in this Bill. . .[52]

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[51] S.C. 1991, c. 11, proclaimed in force on June 4, 1991.

[52] Peter S. Grant, *The Annotated 1991 Broadcasting Act* (Toronto: McCarthy Tétrault) at p. 61.

Section 9(1)(f) should reduce the concerns about a loss of regulatory control in circumstances where telephone companies supply the facilities used by cable operators to provide cable service. Section 9(1)(f) will permit the Commission to review and approve contractual arrangements between telephone companies and cable operators for the distribution of programming to the public, with a view to ensuring that broadcasting policy objectives are respected. Accordingly, this new provision addresses one of the reasons for the maintenance of the cable plant ownership rules.

The extension of CRTC jurisdiction, since the decision of the Supreme Court of Canada in *Alberta Government Telephones v. CRTC*,[53] to directly regulate an increasing number of Canadian telephone companies, should also diminish some traditional concerns that CRTC regulatory control over cable must be maintained through the plant ownership rules and the scope clause.

However, the new authority granted to the Commission in section 9(1)(f) has some limitations. It only permits the Commission to review a distribution contract *prior* to its execution, and only if the Commission requires a licensee to obtain approval. Thus, it appears that if a contract is not submitted to the Commission for review prior to its execution, the Commission has no authority to review it. Further, if problems arise during the term of a contract, the Commission has no authority to review the contract. This limitation may be quite significant, since the term of contracts to provide cable distribution facilities may be expected to be quite lengthy in order to permit sufficient time for the recovery of the required capital outlays.

The foregoing limitations might be dealt with in a number of ways. The Commission could, by regulation or condition of licence, require all relevant distribution contracts to be filed with it for review prior to execution. The Commission could also consider requiring contracts to contain a provision that makes the contracts, particularly longer ones, subject to future Commission policy changes related to achieving the objectives of the *Broadcasting Act*. Finally, the *Broadcasting Act* could be amended to remove the limitations in section 9(1)(f).

It is noteworthy that during the Committee's discussions, the majority of telephone and cable representatives advanced rather different perspectives on issues related to the plant ownership rules. While there were exceptions, the predominant view advanced by the telephone industry was that it should be permitted to build and own transmission facilities that would be leased to cable operators to provide cable service.

Telephone company representatives generally resisted suggestions that their industry might jointly build, own and operate subscriber line facilities in the future. Many cable operators, on the other hand, resisted suggestions that telephone companies or others should play any role in the provision of cable drops or other facilities, except to provide support structures. There was little room for compromise among these views.

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[53] [1989] 2 S.C.R. 225.

However, a number of representatives of the cable industry, and to a lesser extent, the telephone industry, put forward proposals for cooperation among the two industries that could lead to real breakthroughs in network efficiency and capabilities. These proposals included joint ventures and other facility sharing arrangements that recognized the significant ongoing strategic interest of both industries in the design, operation and control of the infrastructure.

These cooperative proposals included:

- "condominium" fibre optic arrangements, under which telephone companies and cable operators would each own separate fibre strands in common transmission cables;
- joint ventures to construct and manage distribution transmission systems to carry both cable and telephone industry signals; and
- a local infrastructure "utility" jointly-owned by the two industries to operate common infrastructure components for both.

Given the different history, ownership and legislative status of the cable and telephone industries in Canada, cooperative proposals such as these provide the best opportunities for the integration of elements of the local infrastructure and the achievement of related efficiencies and network capabilities. Some of the potential efficiency gains from integration of elements of the infrastructure will have to await the development of the necessary technologies and a decline in their costs. However, other efficiency gains may be achieved now, or in the near future, utilizing new approaches such as the wrapping of coaxial television cables and copper subscriber telephone lines in a single sheath. Further gains should be available through cooperative approaches that involve sharing of plant or administration of various elements of the local infrastructure.

There will be those in both industries who will continue to oppose cooperative approaches such as the foregoing. For example, there are some in the telephone industry who believe that they will monopolize the wireline component of the local network infrastructure over time, through the use of broadband ISDN facilities and services such as video dialtone offerings. Similarly, there are those in the cable industry who feel they have technological, cost and marketing advantages, and that they will prevail in the market place without any cooperation with the telephone industry.

Unfortunately, there are also some, in both industries, who would continue to own their own plant regardless of cost implications, because they will be able to persuade the regulator to allow them to charge subscriber rates sufficiently high to provide a fair return on their transmission plant, whether or not it would have been more efficient to share some components of that plant with another industry.

For these and other reasons, some representatives of both industries will oppose cooperative arrangements with the other industry. However, as and when the technology evolves to permit efficiency gains through integration of cable and telephone facilities, there will be increased economic incentives to use such technologies. Shareholders as well as subscribers in both industries should be allowed to benefit from the efficiency gains available through greater integration of the facilities of the two industries. In this regard, government policy and regulation should clearly support and not prevent the achievement of efficient infrastructures.

As the technology advances to permit greater integration and interconnection of telephone and cable facilities, regulatory intervention may be required to ensure that a monopolistic obsession with plant ownership does not prevent the implementation of approaches to network integration or interconnection that would benefit consumers.

As long as both industries are dominant in their markets, they can generally pass on the cost of increased facilities to their customers, whether or not such facilities are efficiently deployed. Therefore, there will be a role for regulation to ensure that capital expenditures on facilities are prudent and reasonable, and do not unnecessarily duplicate other facilities that may have been shared. Regulators should ensure that as and when the technology makes it more cost-effective to do so, consumers do not pay excessively for the failure of telephone companies and cable operators to share infrastructure facilities.

Increasing competition between the telephone and cable industry is sometimes used as the rationale for both industries refusing to enter into joint ventures to integrate or interconnect facilities. However, there is no reason why some types of ventures could not be designed in such a manner that both industries would benefit through accelerated deployment of plant, increased efficiency and capabilities or in other ways, without losing any significant competitive edge in the relatively few areas where the two industries compete.

There are many precedents for the sharing of infrastructure and other essential facilities by competitors in other industries. Airlines share airports and reservation systems. Railways interconnect to use each other's lines. Further, the example of other industries that share pre-competitive or non-competitive resources in Japan, the U.S. and other countries should not be ignored. Joint cable/telephone ventures could improve the competitiveness of both industries vis-à-vis other competitors in Canada and internationally.

In the present Canadian industry environment, cooperative ventures are more likely to result in mutually satisfactory arrangements for the upgrading of the local network infrastructure than network construction plans in which one company, typically the telephone company, builds, owns and operates a network and the other is relegated to the position of a customer. In order to meet the strategic requirements of both industries cooperative ventures will, in all likelihood, have to be designed to include a sharing of ownership, and of some control over the operation of network facilities and related resources.

In the following sections, the CRTC plant ownership rules are reviewed with these concerns in mind.

4.6 Subscriber Drops

The ownership of subscriber drops raised some of the most difficult issues faced by the Committee. The nature and role of subscriber drops in cable systems is described in Appendix C of the report. The *Cable Television Regulations, 1986* define a subscriber drop as follows:

> "subscriber drop" means the equipment or facilities used by a licensee for the distribution of the programming services distributed on its basic band from the point at which these services are diverted from the distribution system to a television receiver, F.M. receiver, channel converter or other terminal device in a subscriber's household or premises for the exclusive benefit of that subscriber;

It is unlikely that technology will permit the cost-effective integration of the cable subscriber drop and the telephone subscriber loop onto a single transmission medium, such as a fibre optic cable, in the near future. There are a number of reasons for this.

Both the cable subscriber drop and the telephone subscriber loop perform their current functions in a cost-effective manner. Although the cable and telephone industries are gradually deploying fibre optic local transmission facilities, they are doing so from the head end and switch toward the subscriber, as it becomes cost-effective to do so. This will generally be the case only in the parts of their networks that require greater capacity or more reliable plant. In the case of both industries, the subscriber line is likely to be the last segment of plant replaced with fibre.

The capabilities of both the coaxial cable drops of the cable industry and the copper loops of the telephone industry are likely to have their lease on life significantly extended through the use of new technologies such as digital video compression. Such technologies will delay for some time the large scale replacement of subscriber plant with fibre optic technology in both industries. It will become more difficult to make the business case for the replacement of existing plant with fibre in the last few hundred metres of distribution plant.

It is also noted that the costs of opto-electronic terminals required to convert fibre optic signals to a form that is usable by the installed base of television, radio and telephone sets, is still prohibitively high for large scale application. However, recent technological breakthroughs at Northern Telecom and other manufacturers hold the promise of removing this barrier, or at least lowering it.

There are other significant obstacles to the shared-use of fibre optic subscriber lines on an economic basis. These include the different network architectures of the substantial installed facilities base of both industries, and the different timing and technology used to optimize network upgrades for the two industries.

For these reasons, it is unlikely to become cost-effective to use a single fibre optic subscriber line to provide both cable television and telephone services in the foreseeable future.

Thus, those that envisage a single integrated line to every subscriber premise will have to wait for some time to see it as a practical reality. If the telephone industry were to construct and provide cable drop facilities for the cable industry on a cost-effective basis in the near future, it would do so using a separate line from the telephone loop. That separate line would normally be a coaxial cable of the same type the cable industry is itself using today.

If empirical evidence is required for this proposition, it can be found in the U.K. and other newly cabled countries. In the U.K., some cable licensees are franchised to provide both cable television and telephone services. The owners of some of these licensees include experienced representatives of both cable and telephone companies,[54] and the expertise of both industries is available to them. Yet the joint cable/telephone service provided by such ventures will use two conductors — a coaxial cable for television signals and a copper telephone loop.

It is noteworthy that these U.K. ventures are employing a new form of cable in which the coaxial conductor and the telephone loop are wrapped together in a single sheath. However, this degree of integration is being achieved only by a substantial adaptation in the architecture of both distribution networks and is feasible only because both networks are being deployed simultaneously.

This example provides further evidence that unless the cable and telephone industries cooperate to a high degree in the planning and provisioning of their subscriber lines, there will be few opportunities to develop joint facilities or new operating methods which could lead to cost savings for both industries.

Some economies of scope are available today in the cooperative or joint provisioning of cable and telephone subscriber lines. This is particularly true in the case of new installations, since a significant proportion of the cost of providing a new line is related to digging the trenches, installing the poles and conduits, or in other costs that could be borne jointly by the two industries. Significant economies can therefore be achieved in subscriber line installations when both services can be simultaneously provisioned.

In new buried plant subdivisions, it has become standard practice in some areas of Canada to undertake joint trenching and installation of subscriber telephone and cable lines. This practice can produce significant savings and should be extended to other areas.

As indicated earlier, further economies could be achieved if the two subscriber lines were integrated into a single sheath (as is being done in the U.K.). Use of a common sheath also has the potential of reducing the environmental and aesthetic impacts of aerial subscriber lines.

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[54] The jointly-owned Vidéotron/BCE Enterprises venture is a good example.

While this approach will have limited application in built up areas, due to the need for collocation of cable and telephone terminals, the concept should be considered in new subdivisions. In order to achieve satisfactory results, extensive coordination would be necessary during the planning and installation stages.

An additional benefit of the use of a common sheath would be the incentive for development of combined subscriber terminals which could result in further savings as well as the development of new hardware, some of which may be exportable.

Except for the cost of support structures, economies of joint subscriber line provisioning are not generally available when one or both of the subscriber lines is already installed. Under such conditions, integration of telephone and cable services onto a single line would likely result in additional costs.

However, economies of joint subscriber line provisioning may emerge in the future, as the technology develops and its costs decline. Government policy and regulation should not be premised on the capabilities of existing technology, and therefore should not preclude the sharing of subscriber lines in areas that are already wired. Policy and regulation should not only not restrict, but should provide an incentive to develop and implement new technologies and approaches that will improve the efficiency of the local subscriber infrastructure.

RECOMMENDATIONS

11. **Cable operators should be permitted to enter into arrangements to use subscriber drop facilities that are wholly or partly owned by another person, including a telephone company. However, such arrangements should be subject to safeguards to retain a competitive local infrastructure and to ensure that the objectives of the *Broadcasting Act* are not frustrated. These safeguards should include the following:**

    (a) **The cable licensee must agree to the arrangement in writing.**

    (b) **The written agreement should be approved by the CRTC (this may be accomplished by way of "type approval" of agreements).**

    (c) **The arrangement must be more efficient or otherwise beneficial to consumers.**

    (d) **The Commission should be assured that service will be provided at a level equal to or better than current industry standards, and that the arrangement will not prevent the achievement of the objectives of the *Broadcasting Act*.**

(e) **Preference should be given to arrangements for the joint ownership of subscriber drops between the cable operator and other parties such as telephone companies rather than one by which the other party owns the drop facility outright and merely leases it to the cable operator.**

(f) **The arrangement should not include any restrictions on the use of the drop facilities beyond those required for technical and safety considerations or reasons of operating efficiency.**

(g) **The agreement should include a written representation that the provision of cable drops or other facilities to the cable operator was not a condition for the provision (or the provision on more favourable terms) to the cable operator of other transmission facilities such as partial systems, support structures, access to premises or other facilities or services necessary for the operation of a cable system.**

(h) **The cable operator should have the right to terminate the lease of the facilities on reasonable terms, bearing in mind the right of the facilities owner to obtain fair compensation for its capital costs.**

4.7 Cable Amplifiers

Amplifiers are a necessary and integral component of a cable television network. Since the amplifier is susceptible to misadjustment and malfunctioning, it is natural that the cable operator would wish to have full control over its operation. Today, the cable industry is mature: about 95% of households have access to cable; the industry has adopted service quality standards; and the CCTA, Regional Associations and major operators have a strong influence over the smaller and sometimes less technically knowledgeable operators.

The substitution of coaxial cable trunks with fibre optics will accelerate rapidly in the future in order for cable operators to maintain their competitiveness and meet increasing service requirements. As a result, trunk amplifiers will gradually disappear from the networks. However, distribution amplifiers will remain in service for many more years or will be replaced by higher performance amplifiers to accommodate increasing service requirements. It appears highly improbable that a company that would upgrade its network with fibre optics would ask a third party to replace and operate its amplifiers.

However, for business reasons or in order to serve residences which cannot otherwise be served, a company might wish to consider leasing its fibre and/or coaxial cables including the amplifiers from a telephone company. If the cable operator can negotiate a mutually acceptable agreement with the telephone company and if the operator is prepared to meet its regulatory obligations, no case could be made to impose on the operator the obligation to own the amplifiers.

RECOMMENDATION

12. The requirement that a cable licensee must own its amplifiers should be abolished.

4.8 Cable Head Ends

The functions associated with head ends are the heart of a cable system, just as the switching function is the heart of a telephone network. The operation of the cable head end is key to the achievement of the objectives of the *Broadcasting Act*.

The local head end of a cable system is defined in the *Cable Television Regulations, 1986*, as follows:

> "local head end" means:
>
> a. the equipment and facilities at any specific location that are used for the reception and processing of programming services that are transmitted by local television stations or, if there are no such stations, by regional television stations, and that are distributed by the licensee, and for the processing of other services that are distributed by the licensee, . . .

Management of programming, tiering of services, service quality monitoring and control are all essential cable operator functions which are implemented from the head end. At this point in the evolution of switching and processing technologies, it is not apparent that any economies of scope could be achieved by combining a cable television head end with any part of a telephone network.

On the other hand, it is recognized that considerable economies of scale can be achieved by distribution to a number of cable systems from a common head end. Such sharing of head ends can be achieved very efficiently by means of microwave radio or fibre optic links. Greater sharing of cable head ends would also permit subscribers to adjacent cable systems access to a wider range of services. Such "sharing" could occur by way of a joint venture or by simply having cable operators provide signal feeds to other systems.

RECOMMENDATIONS

13. Cable head ends should continue to be owned and directly controlled by cable operators.

14. Government policy and regulation should not prevent the sharing of head end facilities among cable operators where it is cost-effective to do so or where doing so would enable cable operators to provide a wider range of services or otherwise better achieve the objectives of the *Broadcasting Act*.

4.9 The Scope Clause

As a result of Telecom Decision CRTC 77-6, a restriction referred to as the "scope clause" was established preventing Bell Canada from imposing restrictions on the use of the transmission facilities it provides to cable operators. In this decision, the CRTC considered two types of arrangements between Bell and cable operators. In addition to approving a new "Support Structure" arrangement allowing cable operators to obtain access for their cables to Bell poles and conduits, the decision approved the continued provision by Bell of "Partial System" arrangements, whereby Bell supplied all facilities to the cable operator but the head end, amplifiers and subscriber drops.

Prior to the decision, Bell had proposed that it be permitted to lease back or share any excess capacity in the facilities leased to cable operators, and also to impose restrictions on the use of the leased facilities that it deemed appropriate. The CRTC decided that: a) any such terms should be part of the tariff and thus subject to regulatory oversight and b) the proposed Bell arrangement was "unsatisfactory" and should be replaced by wording expressing three principles which should govern both types of arrangements. One of these was the "scope clause" which reads as follows:

> There are to be no restrictions imposed by the Company [Bell Canada] on the services to be provided via the coaxial cable. In the Commission's view, section 5 of the Cable Television Regulations should provide a sufficient regulatory basis for examining any questions raised as to the possibility of unfair competition.

Although the decision did not state why Bell's proposal was "unsatisfactory", it would appear that, as with the plant ownership rule, the intent of the "scope clause" was to ensure the CRTC's full regulatory control over cable operators. Hence, the Commission's insistence that all terms be included in a tariff approved by it.

One effect of the scope clause is that Bell cannot lease back or share excess capacity in the facilities leased to a cable operator.

The prohibition against leasing back or sharing excess capacity in facilities leased by a telephone company to a cable operator is a potential barrier to cost-effective sharing of local network facilities. There may be circumstances where it would be more efficient to share coaxial cable bandwidth used for the delivery of cable television services with telephone company's services. Therefore, *with the consent of the cable operator*, a telephone company should be permitted to lease back or otherwise utilize excess capacity in the transmission facilities it leases to a cable operator.

However, the telephone company should not be able to impose restrictions on the use of the leased facilities by the cable operator that are anti-competitive in nature or that would frustrate the objectives of the *Broadcasting Act*. The absence of such restrictions should be assured if the relevant form of agreement is approved by the CRTC.

RECOMMENDATION

15. **The "anti-leaseback" prohibition associated with the "scope clause" should be abolished in order to remove a potential barrier to the cost-effective sharing of local network facilities. However, neither a telephone company nor a cable operator should have the right to impose restrictions on the use of transmission facilities leased to the other, except restrictions reasonably required for technical, efficiency or safety reasons.**

CHAPTER 5

DEVELOPING ADVANCED LOCAL BROADBAND NETWORKS

5.0 DEVELOPING ADVANCED LOCAL BROADBAND NETWORKS

5.1 Upgrading the Network Infrastructure

Questions related to why and how to upgrade the local network infrastructure have moved to centre stage in the telecommunications policy arena in more and more countries.[55]

Questions related to *why* are relatively easier to answer than those related to *how*. The underlying reasons for developing more advanced infrastructures are fairly clear. There is a trend towards globalization of trade in the markets for many types of goods and services that are central to the competitiveness of national economies. Information is an increasingly important factor in most businesses, occupations and institutions. As we move further into the information age, efficient and advanced telecommunications capabilities are an essential prerequisite for global competitiveness and for the survival of social and cultural systems dependent on this competitiveness.

The economic, social and cultural challenges posed by globalization are particularly evident in Canada, due to its heavy reliance on international trade, its relative weakness in many parts of the service sector, and its large and open trade relationship with the U.S. The latter factor will be increasingly significant as the U.S. continues to develop and expand the world's largest and most advanced information economy.

Cable Networks

The major incentive for upgrading the Canadian cable infrastructure comes from the competitive threat of alternate television program distribution systems. These include video rentals and sales, the planned U.S.-based high-power direct broadcast satellites (DBS), and, some time in the future, telephone companies offering video dialtone services. The planned new DBS services will carry little, if any, Canadian programming. The public policy concerns raised by these alternatives are not related to the protection of the cable industry *per se*, but rather to the maintenance of the viability of an effective system for the supply and distribution of Canadian television programming.

While the new DBS satellites are planned to serve the U.S. as their prime market, their signals will spill over into Canada. From a technical perspective, that will enable them to serve the majority of the Canadian market with very little additional cost. Moreover, their base in the U.S. market can provide them with favourable economies of scale that could make them serious competitors, particularly in less densely populated areas of Canada. High-power DBS will thus challenge the cable industry to provide an increasingly attractive and diverse service at an affordable price.

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[55] The nature of this policy debate in the U.S., E.C., Japan and other countries is summarized in Appendix D.

The Canadian cable infrastructure has, over the past two decades, been transformed from a medium primarily devoted to importing U.S. television signals, and thus perceived to be a threat to the viability of the Canadian broadcasting system, to a central element in a broadcasting policy aimed at promoting production and preferential access to Canadian television programming. Accordingly, the potential for DBS and other unregulated distributors of television programming to undermine the cultural objectives of the *Broadcasting Act* provides an incentive for upgrading the Canadian cable infrastructure that does not exist in the U.S. and some other countries.

The transformation in the role of the cable industry has occurred as a result of concerted efforts by policy makers and regulators, as well as the cable industry and other elements of the Canadian broadcasting system, to develop more and better Canadian television programming, and to make it widely accessible to Canadians as part of a diverse and attractive cable package. The cable industry is justifiably proud of the achievements of these concerted efforts. Over the last decade, 18 new Canadian specialty and pay television services have been launched on cable systems, creating a business worth well in excess of $300 million. That business hires Canadians to produce programming that reflects the Canadian experience to Canadians.

The cable industry's high penetration levels have enabled the CRTC to implement regulatory mechanisms such as Canadian signal carriage priority, simultaneous substitution, tiering and packaging, to support the viability of Canadian television program distribution on both new and existing services. These regulatory mechanisms and the industry's efforts have largely been successful. The number and quality of Canadian television programs in distribution is increasing, as is the overall viewing share of Canadian programs.

Maintaining the central role of the cable industry in achieving the cultural objectives of the *Broadcasting Act* in an increasingly competitive environment will require it to significantly upgrade its network infrastructure over the next few years. The industry will have to introduce the technologies that will permit it to meet the ever increasing expectations of consumers in terms of quality and choice. This will include the deployment of digital video compression technologies, wide scale addressability and fibre optics in the core segments of its networks.

This process of upgrading the cable systems should be supported by government policy and regulation. This is so, not because the cable industry should be favoured as a local network operator over the telephone industry, but because, at this stage in the evolution of the local infrastructure, cable is uniquely positioned as a medium that can be used to advance the cultural objectives of the *Broadcasting Act*. Based on available and foreseeable technologies, the telephone industry would have to invest many billions of dollars, and orders of magnitude more than the cable industry, to be able to offer video services of a comparable level of quality to the home.

Some of the most difficult issues considered by the Committee related to whether a common carrier or video dialtone approach to the delivery of television programming would support or undermine the objectives of the *Broadcasting Act*. Telephone representatives tended to support the development of an unregulated and unrestricted local video program distribution environment. That type of an environment was generally seen by the cable industry and the Canadian programming industry as a threat to the Canadian broadcasting system. However, the future video capabilities of the telephone industry may well be deployed in such a way as to support new Canadian services, and to promote Canadian cultural objectives.

Regardless of the answer to these difficult issues, it can be concluded that no economic or service justification has been identified at this time to support the full scale upgrading of telephone networks to broadcast video standards as a better means of achieving the cultural objectives of the *Broadcasting Act* than the upgrading of cable networks.

That is not to say that there are not other good reasons for Canadian policy and regulation to support the upgrading of the local telephone infrastructure. However, the objectives for this upgrading, as well as the approaches and core markets of the telephone companies will continue to be quite different from those of the cable industry.

Telephone Networks

Around the world, and particularly in the countries that are Canada's major trading partners, the local telecommunications networks of the late 1990s will have significantly more capacity and capability than today's telephone networks. Industry, government, educational institutions, and other elements of the economic and social structure of most countries will rely ever more heavily on information transmitted through their telephone networks.

Canada must have access to telecommunications networks that are at least as efficient and capable as those of other industrialized nations in order to maintain the competitiveness of its economy and the effectiveness of its social systems.

Advanced communications capabilities will enable most, if not all Canadians to work, learn and live more efficient, productive and, hopefully more enjoyable lives. Without these capabilities, Canada's competitive position will be significantly handicapped.

The telephone infrastructure will have to be upgraded to deliver an ever more diverse array of sophisticated and bandwidth-hungry communications services. Some of the technologies that will be used by the telephone industry to meet the challenges and opportunities of the future will be the same as those of the cable industry, including fibre optic transmission media, digital technologies and video compression technologies.

However, many other technologies will also be used by the telephone industry. These include technologies related to narrowband and broadband ISDN, digital switching, multimedia applications and many more. Among the most promising technologies are those which employ increasing amounts of computer processing capabilities to define and deliver an increasing array of enhanced services. Some of the future services that will be delivered on telephone company networks will utilize artificial intelligence and virtual reality technologies that have the potential to change and improve the lives of Canadians more than the printing press or the television set ever did.

Canadian public policy should support and encourage the development of an advanced telephone network infrastructure in order to ensure that Canadians remain in the forefront in exploiting the potential of the Information Age in all aspects of their lives.

Specific issues related to the upgrading of telephone networks to provide broadband capabilities are dealt with further in Chapters 6, 7 and 8 of this report.

Fibre-to-the-Home and Office

Some policy makers in the U.S., the EC, Japan and elsewhere advocate policies aimed at accelerating the deployment of broadband fibre optic networks to every home and office, at a considerably faster rate than market demand by itself would justify. These proposals generally call for the upgrading of the local telephone infrastructure rather than the cable infrastructure.

Proponents of accelerated fibre deployment generally justify their position based on the anticipated development of new products and services that will enhance the international competitiveness of their domestic communications users. Proponents also point to increased research and development as a benefit, as well as job spinoffs and strategic positioning for future markets.

A major drawback of government initiatives to support accelerated deployment of a particular type of infrastructure is that the government must select the form of infrastructure to support at a time when the underlying technologies are evolving at an accelerating rate. Communications technologies and markets have become increasingly dynamic, and any government policies which are premised on the use of a particular form of broadband network technology run the risk of being proven wrong if technological developments take an unexpected turn.

Recent developments in the area of digital video compression on copper telephone loops provide an example. These developments may well enable the transmission of an adequate level of broadband service to satisfy the demands of most residential telephone customers for decades into the future. If these developments move successfully from the laboratory into the field they will significantly undermine, or at least delay, the need to deploy fibre to every home.

This is not a time for technological determinism on the part of government agencies. The more centrally directed or controlled telecommunications network developments are, the greater the risk that substantial resources could be wasted by backing the wrong network strategy. Over the past decade, a number of significant government or PTT initiatives around the world which have supported the accelerated deployment of specific new telecommunications technologies have resulted in major failures. These initiatives not only result in stranded investment in obsolete technology but, depending on the degree of government financial support, also in increased government deficits.

Countries with more varied, dynamic and flexible telecommunications markets and policies are more likely to be able to adapt to changes quickly and to benefit from them. In this respect, Canada is well positioned. Unlike countries such as Japan and many others in Asia, Europe and the rest of the world, Canada has two well-developed local "wire and cable" networks, as well as an increasing number of niche players. Moreover, in Canada, each of the two main local network industries has a variety of different owners pursuing different strategies to accomplish the goal of developing efficient and attractive network services.

RECOMMENDATIONS

16. Government policy and regulation should permit the timely and cost-effective upgrading of the cable television network infrastructure in order to maintain the cable industry's competitive position vis-à-vis alternate means of television program distribution which undermine the objectives of the *Broadcasting Act*.

17. Government policy and regulation should permit the upgrading of the telephone network infrastructure to enable it to provide Canadian business, government, educational and residential consumers with advanced telecommunications services that are competitive with those available in other industrialized countries.

18. Telephone and cable industries should be permitted to cooperate, share and integrate their facilities wherever it would accelerate the introduction of more cost-effective advanced local networks and particularly where it would enhance the cable industry's ability to achieve its *Broadcasting Act* objectives. However, such cooperative initiatives should be structured so as to maintain a competitive service environment between the two industries.

19. Research and development of cable/telephone integration technologies should be given a high priority in industry and government R&D programs.

20. Canadian policy and regulation should not adopt an industrial strategy of accelerating the deployment of fibre lines to every home and office at a faster rate than is justified by market demand.

5.2 Development of Technical Standards

Background

The upgrading of the local network infrastructure raises a number of issues related to technical standards. This report has focused on the opportunities for more efficient and capable networks through selective integration of elements of the local network infrastructure. Such integration will require appropriate technical standards to be developed.

The introduction of integrated voice, data and video services on telecommunications networks and the greater interconnectivity of networks, have resulted in an increasing emphasis on the need for compatible standards. In a number of countries, efforts are being made to promote the Open Network Architecture (ONA) concept in order to provide system users and network service providers with the ability to access and combine facilities and applications provided by different suppliers. ONA developments could have significant potential for the implementation of integrated voice, data and video services.

However, international standards activities have not focused to a large extent on the convergence of broadcasting and telecommunications. This should not come as a surprise, since there are few places in the world with as ubiquitous a presence of two local networks and as powerful a cable industry as is found in North America.

Traditionally, cable television systems have been independent from telephone systems, with no interconnection and little or no need for technical compatibility. For cable television systems, only basic minimum signal quality and radiation standards have been enforced by the Department of Communications. Some of these standards are derived from an international set of "cable network systems" standards proposed by the International Electrotechnical Commission known as *IEC Standard, Publication 728-1*. Subject only to those minimum standards, cable operators choose the equipment and cable facilities they wish for the construction of a cable network. Manufacturers have set their own standards for equipment, bearing in mind the necessity for the cable operator to meet the official Broadcast Procedure 23 minimum system standards. Canadian standards are generally similar to U.S. standards.

Recently, there has been a growing trend towards interconnection of separate cable systems. This is accomplished by means of coaxial cable, microwave or fibre optic links. In each case custom engineering is employed, having regard to the minimum standards described above.

Some Committee members expressed the opinion that the development of standards for greater integration of telecommunications systems and networks should be an essential element of Canadian standards development activities. Members submitted comments relating to the areas where standards are required and the process of standards development.

It was submitted that standards of safety and harm to the public in general, the customer or the network should be addressed first. Standards pertaining to connectivity, compatibility, and operational characteristics at the customer/telephone company/cable operator interface form the second priority. Quality of service and performance criteria areas come as third priority. Specific areas where standards development was proposed, included: digital compression and associated transmission standards, addressable scrambling of video services and standards for networks and terminals to facilitate connection and disconnection of customers to whatever facilities are available.

Opinions were divided on the process for standards development. Generally, suggestions ranged from the voluntary development of standards by industry-sponsored standards bodies to the Department of Communications adopting a lead role. Members strongly supported the rapid adoption or adaptation of emerging international standards, in most cases. It was suggested that unique Canadian standards should as a rule be avoided and that, in any event, international acceptance should be sought at an early stage for any Canadian-originated standards.

It was suggested that the standards development process in the cable industry is weak. Industry action and government support would appear to be required in order to develop and encourage the adoption of compatible standards that will permit the efficient interconnection of advanced cable services in the future. In this regard, the telephone industry is already considerably more organized and advanced and no significant problems were identified by the Committee.

Conclusions

As a rule, Canada is not in a strong enough position to play a major role in setting international standards. Canada's role in the international standards setting area is limited not only by its size but by the nature of its communications equipment manufacturing industry. Canadians may, however, significantly influence the definition of some standards and the priority for their adoption.

The Canadian telecommunications industry has produced one dominant domestic manufacturer, Northern Telecom. However, for reasons of economic efficiency and in order to maintain network compatibility with more than one supplier, Northern Telecom and the Canadian telephone companies generally adopt international standards. Northern Telecom's international competitiveness has, in the past, been enhanced because Canada and the U.S. have adopted the same standards.

In international terms, Canada is not a major player in the development of products and services related to cable television networks. It does not, for example, have a dominant domestic manufacturer of cable equipment or cable system components. Consequently, neither the Canadian cable industry nor the Canadian government has been in a position to significantly influence the evolution of international cable standards.

This report recommends that government policy and regulation should support the integration of elements of the local network infrastructures of telephone and cable operators where it would be more efficient than the operation of separate facilities. To this end, it will be necessary to develop standards for the integration and interconnection of a variety of telephone and cable network elements and systems.

Cable and telephone companies and their subscribers would benefit from the wider range of information and processing services that could be available to them if their network infrastructures were interconnected with other communications systems. These include systems that have been, or will be developed by a variety of entrepreneurs, educational and government institutions, electronic publishing of various types and other new entrants to the communications and information market place. Standards will also be required to facilitate the interconnection of such services, both to and between telephone and cable networks.

In the future, it is likely that Canadians will be able to access video, multimedia and other broadband services by means of different telecommunications media, including cable systems, satellites, terrestrial radio systems and the wireline systems of telephone companies. There is likely to be a proliferation of sources of video programming, as well as multimedia and other "software" that can be delivered via telecommunications.

As indicated in Chapter 8, the world of video program delivery is evolving from a mass media broadcast mode toward a consumer choice driven mode. Canadian providers of video and multimedia programming and of other communications and computer software would benefit from increased access to telecommunications media that can deliver their products and services to the public.

All of these factors suggest that there will be an increasing requirement for service and interconnection standards to facilitate the interconnection of Canada's various telecommunications networks and services. In many cases, such interconnection will permit the introduction of more advanced services more quickly. A simple example is home shopping services delivered via cable which would benefit from access to some form of Electronic Data Interchange network interconnected with the telephone network. The absence of adequate interconnection standards is likely to delay the development of such new services, increase their costs of delivery or result in costly retrofit operations.

The rate at which Canada adopts or develops standards can therefore enhance the international competitiveness of industries involved in the exporting of hardware, systems, services and know-how. The fact that the U.S. is likely to remain Canada's largest trading partner, in the communications field as well as most others, makes it particularly important that Canadian government and industry should not delay in adopting standards to be used in the U.S. for products and services for which there is a potential Canadian export market.

RECOMMENDATIONS

21. Canadian industry and government should cooperate to develop or adopt standards for the integration and interconnection of telephone, cable and other communications networks. This standards development activity should be industry-led. However, government should participate to ensure that public policy objectives are met, including the maintenance of an effectively competitive local network environment, and to mediate disputes.

22. Canadian government and industry participation in the work of international standards Committees and R&D organizations should be expanded to include areas related to the integration and interconnection of telephone, cable and other communications networks.

23. The Canadian cable industry should, with the support of the Department of Communications, develop standards for upgrading cable networks with the following objectives:

- **increasing the compatibility and service life of cable technologies installed by various operators across the country;**
- **reducing the costs and increasing the efficiency and capabilities of cable technologies installed by all cable operators; and**
- **facilitating future interconnectivity, and where it is more efficient, greater integration, of cable facilities with those of telephone companies and other communications networks.**

24. Standards that are developed for the integration and interconnection of telephone and cable networks with each other and with other communications systems should be consistent with the application of the Open Network Architecture (ONA) concept. Under this approach, over time, the operators of the two networks as well as other suppliers and users of communications services should be able to increase their efficiency by accessing and using only the specific elements of the local network infrastructure that they require.

CHAPTER 6

TELEPHONE/CABLE CROSS-OWNERSHIP

6.0 TELEPHONE/CABLE CROSS-OWNERSHIP

6.1 Background

Since 1968, a number of restrictions have been placed on the eligibility of telephone companies to hold broadcasting licences. These restrictions are:

- In 1968, the *Bell Canada Act* was amended to prevent Bell Canada from applying for or holding a broadcasting licence. The 1991 *Broadcasting Act* retained this provision, updating Section 7 of the *Bell Canada Act* to read as follows:

  > Neither the Company nor any person controlled by the Company shall directly or indirectly hold a licence issued under the *Broadcasting Act* or carry on a broadcasting undertaking within the meaning of that Act.

- On December 3, 1969, the CRTC issued a Public Announcement entitled "Licensing Policy in Relation to Common Carriers", stating that, in general, it would not be in the public interest to encourage common carriers to hold cable television licences. This announcement contemplated that exceptions might be made in certain circumstances where "smaller common carrier companies may be the only entities capable of providing a CATV service as operators in certain of Canada's smaller population centres . . . "

- In 1972, an Order in Council issued under the *Broadcasting Act* identified "agents of Her Majesty in right of any province" as a class of persons ineligible to hold licences. This rule, still in force under Order in Council PC 1985-2108, prevents the two provincially owned telephone corporations, Manitoba Telephone System and Saskatchewan Telecommunications from holding a licence.

Bell Canada is the only telephone company specifically prohibited by legislation from holding a broadcasting licence. However, in practice, there have been no instances of cross-ownership of major telephone companies and cable operators. Such cross-ownership has been limited to a few isolated cases involving smaller telephone companies and small cable operators outside of major centres. For example, the CRTC recently approved the acquisition of a small town Ontario cable system by an independent telephone company operating in a nearby town, but not in the same service area.[56] Another cross-ownership situation exists in the case of several small Quebec cable systems and telephone companies.

Canadian cable operators face no explicit legal or policy restrictions against the provision of telecommunications services similar to those offered by telephone companies, including data transmission services. However, technological limitations and existing cable system architectures prevent cable operators from offering basic telephone service.

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[56] Decision CRTC 91-840, *Clearview Cable TV Limited and Amtelecom Group Inc.*, 22 November 1991.

The Committee considered whether the development of the local network infrastructure in Canada would be enhanced by permitting telephone companies to hold cable licences, that is "distribution undertaking licences", under the *Broadcasting Act*. The Committee did not deal with the issue of telephone company ownership of television or radio broadcasting licensees. However, the issue of telephone and cable participation in programming undertakings that distribute their service by means of telecommunications is dealt with in Chapter 8.

Telephone companies advocated the elimination of restrictions against their holding cable licences. They submitted that, with proper regulatory safeguards, telephone company ownership of cable licensees could help further the objectives of the *Broadcasting Act*. It was suggested that restrictions against cross-ownership impede telephone and cable operators from implementing opportunities to achieve potential economies of integration. It was also noted by telephone companies that comparable barriers do not prevent cable operator entry into telecommunications markets, and that the result was an asymmetric competitive environment.

Most cable representatives expressed concerns about the elimination of restrictions against telephone company ownership of cable licensees. Cable representatives emphasized their industry's responsibilities under the *Broadcasting Act* to protect and enhance Canadian programming. They argued that permitting telephone companies to hold competitive cable licences would undermine the financial viability of the cable industry. Even if its financial viability was not undermined, cable representatives suggested that the ability of the cable industry to continue its present level of contribution to the achievement of the objectives of the *Broadcasting Act* would be threatened if cable operators faced competition from telephone companies.

Cable representatives suggested that competitive telephone company entry into the video program distribution market would be accompanied by cross-subsidization from monopoly telephone services, to the detriment of both telephone subscribers and cable industry.

Several representatives of the cable industry pointed out that telephone companies are not in the information content or entertainment businesses and have no particular expertise to lend or contribution to make in the area of programming content. Cable representatives also submitted that there were no efficiencies to be gained from the joint operation of cable and telephone networks by a telephone company, and that such joint operation would only reduce the present and potential benefits of a competitive local network environment.

Finally, it was suggested by some that the telephone industry would exercise too much control over the local distribution infrastructure if it controlled both the common carrier and broadcast program distribution aspects. It was suggested that such a concentration of control might result in a reduction of diversity and innovation in network systems and services.

This latter concern would presumably be mitigated as long as another cable operator remained as a viable competitor in a particular local service area. However, there appear to be strong economies of scale in the delivery of television program services over a cable network, and it seems likely that, over the long run, a second cable television network would not be viable. To date, competitive cable systems have not had a strong track record in the few U.S. jurisdictions where they have been licensed.

6.2 Conclusions

The objective of integrating various elements of the local cable and telephone infrastructures might be enhanced if telephone companies were able to hold broadcasting licences. However, depending on the manner in which a cable licensee was acquired or established, a number of significant concerns arise with respect to telephone company/cable cross-ownership.

It should be noted, for the purpose of the discussions in this section, that the concerns about telephone/cable cross-ownership are generally applicable only to the cross-ownership of cable systems and telephone companies that operate local *wireline* networks, or their affiliates.[57] The definition of a telephone company for the purposes of the *Railway Act*, or the new definition of a telecommunications carrier proposed in *Bill C-62* include other network operators such as cellular telephone companies and possibly resellers. However, the concerns and recommendations set out in this section would not apply to such entities, which may fall within the legal definition of a telephone company, but do not operate local wireline networks.

If telephone companies were generally permitted to hold a cable licence, a number of options would be available to them that they do not have today. These include:

(a) starting up competitive cable systems *within* a telephone company's own service area;

(b) buying controlling interests in existing cable licensees *within* a telephone company's service area;

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[57] For the purposes of this discussion, it should be noted that an affiliate is defined in the *Canada Business Corporations Act*, S.C. 1988, c. 2, as "an affiliated body corporate", and, for the purpose of this definition, reference should be made to paragraphs 2(a) and (b) which read as follows:

(a) one body corporate is affiliated with another body corporate if one of them is the subsidiary of the other or both are subsidiaries of the same body corporate or each of them is controlled by the same person; and

(b) if two bodies corporate are affiliated with the same body corporate at the same time, they are deemed to be affiliated with each other.

(c) buying a minority interest in an existing or new cable licensee *within* a telephone company's service area; and

(d) holding cable licences (through acquisition or starting up new cable systems) *outside* a telephone company's service area.

The implications of each of these options will be considered in turn.

Option (a) involves a telephone company starting up a cable system within its own service area to compete with existing cable operators in that area.

Under this scenario, it might be thought that the network infrastructure of the telephone company-owned cable system could be integrated with that of the telephone network and thus operate more efficiently than a stand-alone cable system. However, as discussed in Chapter 3 and elsewhere in this report, no member of the Committee and no one who made submissions to the Committee substantiated this suggestion.

In fact, to be competitive using today's technology, a new telephone-owned cable network would probably utilize a relatively similar combination of fibre and coaxial cable as that which the more advanced cable systems use today. The result would be the construction of a duplicate cable network largely separate from the telephone network.

Opportunities for greater cable/telephone network integration will develop as technologies advance. However, there would not appear to be any cost-effective technological options available today, or on the horizon, which would increase efficiency through cable and telephone network integration that could be exploited by a telephone-owned cable system that would not be equally available to a separately owned cable system working in cooperation with the local telephone company.

Under ***Option (b)***, a telephone company would buy a controlling interest in an existing cable licensee operating within its service area.

This scenario would result in the reduction of competition in the local network infrastructure. Such a reduction of competition would decrease at least to some degree, incentives to operate the cable system efficiently and to innovate in the supply of new services in the markets that are presently or potentially competitive between the telephone and cable industries.

It is arguable that the disadvantages of such lost incentives would be outweighed by the increased efficiency resulting from the integration of the telephone and cable infrastructure. However, as indicated in Section 3.1, it does not appear, at this point in the evolution of the technology of the local network infrastructure, that there are any significant overall economies of scope in the joint provision of telephone and cable services over a single infrastructure.

Consequently, the potential benefits of Option (b) would appear to be outweighed by the potential loss of the benefits of competition in the local infrastructure. In addition, as stated earlier, the benefits of network integration available today or in the foreseeable future can be achieved through a cooperative approach between the two industries. This conclusion could change in the future when and if technologies develop which make it significantly more efficient to provide telephone and cable services over a single network infrastructure.

The concerns related to the reduction of competition may not apply to the same extent if, rather than controlling a cable operator in its service area, a telephone company and a cable operator jointly-owned a separate entity which operated the wireline network infrastructure in their mutual service area. Such an entity could lease transmission capacity to the telephone and cable operators and possibly to other providers of competitive communications and information services.

Such a joint infrastructure operation would be warranted when and where it could operate elements of the infrastructure more efficiently than two separate operators. If the telephone company and cable operator were the joint owners of such an "infrastructure utility", they would have a common interest in making its infrastructure and operations more efficient. The scope of operations of such joint infrastructure utility could be limited to a small community or route, or could extend to a large portion of the network in a particular area.

In order to maintain the benefits of a competitive local services market, any such jointly-owned infrastructure utility should be strictly a wholesaler of transmission capacity and the telephone companies and cable operators which owned it should continue to compete as service providers. Moreover, both network operators should continue to be free to construct elements of the local network infrastructure on a stand-alone basis where it is more efficient to do so.

Option (c) involves a telephone company buying a minority interest in an existing or new cable licensee.

This option appears to have a number of advantages and relatively few potential disadvantages. The limited cross-ownership interests held under this option would be likely to increase the dialogue between telephone companies and cable operators in areas that may lead to more efficient operation or improved services. It provides an added financial incentive for the development of cooperative arrangements for the sharing of infrastructure elements or administration without the same level of concern about decreased competition, provided appropriate safeguards are in place to prevent *de facto* control by the telephone company.

Option (c) also provides a new source of equity capital for the cable industry to meet the challenges of upgrading its network infrastructure. This new access to capital could be particularly beneficial in remote underserved areas, such as those licensed to Part III cable systems by the CRTC. Capital has generally been more difficult to raise for cable extension and upgrading projects in these remote areas.

Opportunities will emerge under Option (c) for the development of test beds for different levels of network integration in an environment where there are greater financial incentives than exist today. Depending on the level of integration that occurs, and the related benefits and disadvantages, the experience learned from such test beds could be useful in policy and regulatory deliberations on the future of cross-ownership and network integration policies.

There are risks in permitting telephone companies to hold a minority ownership interest in cable operations. For example a large, well-financed telephone company that held a 49.9% interest in a cable operation, with remaining equity interests spread among a number of smaller and less well-financed investors, may be able to exercise considerable influence, for example, to prevent the cable operator from investing in a new technology that will permit it to compete with the telephone company in the non-programming services market. Potential competition might also be restricted through shareholder agreements, management agreements, financing arrangements and a variety of other mechanisms.

Accordingly, the removal of the current *de facto* restrictions on telephone company ownership in cable operations ought to be structured in such a way as to achieve at least some of the potential benefits of cross-ownership, while preserving the benefits of local network competition.

Such a balance could be achieved by implementing an approach which generally limits permissable telephone company ownership to 30% or so of the voting interests in a cable operation, prohibits the telephone company from being able to exercise *de facto* control over the cable operation, and maintains regulatory supervision to ensure that the telephone company does not otherwise prevent the cable system from competing with the telephone company.

In the case of cable operations in remote and underserved areas, such as those covered by the CRTC's Part III cable licences, the potential benefits of telephone company investment in cable appear to be considerably greater. These benefits include access to additional capital and the incentive for greater efficiency through cooperation in the construction, operation and maintenance of the local network infrastructure. The risks of cross-ownership appear to be very small in such areas, given the very limited potential for competitive benefits. Many of the current Part III licensees have problems raising sufficient capital to build and upgrade their systems, and there is little prospect that they could ever become viable competitors with the telephone companies.

Accordingly, the potential benefits of telephone company investment in cable operations located in remote and underserved parts of the telephone company's service area outweigh the disadvantages. There does not appear to be a sound reason for maintaining any ownership restrictions in these areas.

The conditioned approach to cross-ownership of cable operations by telephone companies that is outlined in this section will be less than satisfactory to some members of both the telephone and cable industries. However, the approach will enable some telephone companies and cable operators to develop mutually beneficial ownership arrangements that can provide an incentive for the development of more efficient and better solutions to serve the public. Some of these solutions could, in time, provide models for the more general improvement of the local network infrastructure.

Option (d) involves the holding of a cable licence by a telephone company (through acquisition or starting up a new cable system) outside the telephone company's service area. Based on the reasoning expressed above there would not appear to be any compelling policy reason for prohibiting this form of cross-ownership, so long as the owning telephone company had the incentive to permit the cable licensee to compete with the telephone company serving the licensee's area.

In this regard, the recent consolidation of Stentor operations suggests that a Stentor member company would be so closely aligned with other Stentor members that it would not have an incentive to compete against another member if it owned a cable system in the latter's service area. It may be, that even before the Stentor reorganization, Telecom Canada members would have been reluctant to actively compete in each others' territories. This factor should be kept in mind in considering any changes to the restrictions against cross-ownership.

Finally, it is noted that the discussion of cross-ownership in this section focuses on the ownership of cable operators by telephone companies and not *vice versa*. That is because the section focuses primarily on existing policy and regulatory barriers. There are no current regulatory barriers to ownership of telephone companies by cable operators. However, as indicated in the following recommendations, generally similar restrictions should apply to the ownership by cable operators of interests in existing local wireline telephone networks, since such cross-ownership would also reduce the potential benefits of a competitive local network environment.

RECOMMENDATIONS

25. In general, neither telephone companies nor their affiliates should be permitted to directly or indirectly own or control cable systems located within their service area or the service area of an affiliate. For these purposes, Stentor member companies should be considered affiliates of each other. Similar ownership restrictions should apply to investments in the local wireline network operations of telephone companies by cable operators and their affiliates.

26. Telephone companies and their affiliates should be permitted to hold up to a 30% minority interest in any cable system operating within the same service area, provided it is clear that the telephone companies will not exercise control in fact over the cable system and that telephone company ownership

will not otherwise prevent the cable system from competing with the telephone company.

27. Telephone companies and their affiliates should be permitted to own cable systems operating in remote and underserved parts of their service areas (areas equivalent to those served by the CRTC's Part III systems).

28. Subject to the foregoing recommendations, there should be no restrictions against ownership of cable systems by telephone companies. Generally similar rules should apply to the ownership by cable operators and their affiliates of interests in local wireline telephone networks as those applying to telephone company ownership. No restrictions should apply to the ownership of cable or telephone operations located out of the service area of a cable or telephone company or its affiliates.

29. Government policy and regulation should not prevent the joint ownership by telephone companies and cable operators of separate entities that would own and operate elements of the local transmission infrastructure, where the establishment of such entities would be a more efficient means of providing service, and particularly in less densely populated areas.

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CHAPTER 7

TELEPHONE COMPANY ENTRY INTO LOCAL BROADBAND MARKETS

7.0 TELEPHONE COMPANY ENTRY INTO LOCAL BROADBAND MARKETS

7.1 Background

The nature and conditions of telephone company entry into local broadband markets, and particularly the local video distribution market, were considered at some length by the Committee.

The development and deployment of new technologies, particularly those related to fibre optics, digital transmission and switching, digital compression and broadband-ISDN, will enable the local telephone infrastructure to provide an expanded range of broadband services to an increasingly wider subscriber base. In time, this will include the capability to deliver video services as well as multimedia services which combine data, voice and video images. Networking of multimedia applications could well become a significant new means for telecommunications users to enhance their productivity and competitiveness during the 1990s.

International standards are becoming available to facilitate the provision of an increased capability for interactive broadband communications on telephone company networks, both on a national and international basis. Canadian telephone companies should remain in the forefront of the international carrier community in deploying and implementing the capability to provide new services over a range of bandwidths in order to meet customer demand.

Telephone company representatives on the Committee foresaw the introduction of more variable bandwidth services that users will access in a manner similar to the current procedures for a telephone call. That is, a customer would use telephone company dialtone to access an enhanced network, and then negotiate and confirm the provisioning of the required capability (bandwidth) and connectivity (destination) for the application intended. The required bandwidth would be application-specific and could range from 64 kbps to multi-megabits per second.

Increased network capabilities will gradually permit a broader range of customers to receive and transmit video signals. Over the longer term, some customers will be able to use this capability to access video "libraries" using the telephone network. This latter type of application has been referred to as a "video dialtone" service in some contexts. However, in the shorter term, telephone company services are likely to be configured to permit a relatively small customer base to access a diversity of interactive broadband services, including not only video services, but multimedia services as well as voice, music and high speed data service. Accordingly, some members of the Committee preferred to refer to this family of services as "broadband dialtone" services, rather than video dialtone services.

The development of such broadband dialtone capability is considered by the telephone industry to be a natural evolution of Plain Old Telephone Service (POTS) dialtone to meet the evolving telecommunication needs of Canadian society during the 1990s and beyond. This development will allow interactive high speed data and video communication to become an integral part of the Canadian lifestyle at work and at home. It could promote an environment where new information services, including multimedia products, can be produced by a variety of Canadian and international sources and potentially be disseminated easily to consumers.

Telephone company development of such services would be likely to stimulate significant Canadian research and development of new services. It would provide opportunities for the development by Canadian entrepreneurs of a number of known and as yet unknown visual and video communication applications, based on service concepts utilizing multimedia, artificial intelligence and virtual reality applications. Such services could be delivered to commercial, institutional and ultimately residential premises, utilizing the expanded bandwidth capabilities of the telephone industry's network. Some of these services could have significant manufacturing spinoffs that would be beneficial to the Canadian economy.

Fibre optic and other broadband transmission technologies are not being introduced by telephone companies as part of a wholesale replacement of existing plant. Rather, such broadband media are being introduced in a phased manner, from the telephone companies' central offices toward the customer, when and where they are cost-effective. While fibre will move a long way toward the curb by the end of the century, it is highly unlikely that telephone companies would replace their existing copper distribution networks with ubiquitous fibre-to-the-home networks for decades. Instead, broadband media will initially be deployed to meet specific demand for high capacity applications, for example, commercial, industrial, institutional (e.g. government, educational and library) and similar purposes.

This trend in the evolution of telephone networks suggests that telephone companies will first concentrate on broadband multimedia and video distribution service opportunities in business, government, educational, library and other institutional applications. New and largely unserved markets for these applications should offer significant opportunities not only to telephone companies but also to producers as well as users of Canadian voice, music, data, multimedia and video programming services.

7.2 Impact of "Video Dialtone" Services on the *Broadcasting Act*

Representatives of cable operators and a number of other participants in the Canadian broadcasting, video and music industries expressed concerns about telephone company entry into broadband distribution markets. Most of those concerns related to the impact that the distribution of television programming by telephone companies could have on the ability of the cable industry and the Canadian broadcasting system in general to meet the cultural objectives associated with the *Broadcasting Act*. The issues related to these concerns will be considered in the remaining sections of this chapter.

It was suggested by some Committee members and others who made submissions to the Committee that "video dialtone" type services would undermine many of the support mechanisms for Canadian programming that are currently found in Canadian broadcasting regulation.

In a video dialtone environment, it may well become possible for a telephone subscriber in Kanata, Ontario, for example, to dial into a "video jukebox" in Rochester, New York. She could dial up one or more of such foreign or Canadian video program distributor "points of presence" to access her favourite Hollywood movies, her favourite soap operas complete with American soap commercials, or her favourite new digitally recorded pop music hit.

In such an environment, the viability of a number of current regulatory support mechanisms would be called into question. These would include the cable carriage priority rules for Canadian television signals, the cable service tiering and packaging rules, the Canadian content quotas for television and radio broadcasters, the simultaneous program substitution rules, and *Bill C-58* tax programs.

Some have suggested that in a video dialtone environment the same general regulatory approach should be applied to telephone companies as is applied to cable video program distribution. In other words, if and when telephone companies implement video dialtone capability, they should, in principle, provide the same general level of access to and support for Canadian programming as do the cable operators. However, the interactive nature of the telephone system, the fact that it operates on a common carrier basis, and the fact that a digital bitstream is not distinguishable by its content will make it difficult, if not impossible, to implement that principle.

Electronic video program distribution markets are moving inexorably from a programmed mass-market broadcast mode to a narrowcast, interactive mode, driven by individual consumer choice. Over the longer term, it will be possible for consumers to access "video jukeboxes" or their equivalent via their telephone company access lines and to dial up their programs of choice, when they want, from wherever in the world they want.

However, the telephone companies will not be the first to introduce this world of consumer choice. Canadian cable operators have already moved into that world with pay-per-view (PPV) video services, some of which will soon be expanded to 40 or 80 channel capacities. With this capability, cable operators will become a more formidable competitor of video stores and DBS, but they and their regulators will have less control over what is seen on Canadian television screens.

However, while the introduction of PPV services using Near Video on Demand (NVOD) technologies will cause cable operators and their regulators to lose some degree of control over the distribution of television programs, some support mechanisms for Canadian program distribution will stay in place. For example, the PPV services recently licensed by the CRTC are delivered on the basis that a predetermined supply of Canadian films must be available, that a significant proportion (30%) of gross distribution revenues must be invested in Canadian films, and that Canadian programs receive other preferences.

Thus, even after the full introduction of PPV services, the cable industry will still play an important role in the Canadian broadcasting system by controlling what programs are offered to Canadians, by ensuring that a fair supply of Canadian programs is available and by helping to finance some of those programs. In this regard, the role of cable will continue to be similar to the traditional role played by the broadcasting industry.

However, the role of the cable industry and its regulator has never gone beyond controlling the menu of the programming offered, and supporting the production of some Canadian programming. The final selection of the actual program or channel viewed has always rested in the hands of the consumer. In this sense, PPV is not a radical departure. It will only continue the long-standing trend to giving the viewer a greater selection of programs to choose from. Moreover, to the extent that PPV allows the cable industry to recover market share from video stores, it will in fact increase the degree to which Canadian programs are given financial support and prominent exposure in Canadian video distribution systems.

Thus the introduction of a NVOD-based PPV service by the Canadian cable industry, on a regulated basis, is generally seen as less of a threat to the support mechanisms for Canadian programming than a true video on demand service or a "video dialtone" service would be. Nevertheless, the difference in impact between cable-delivered PPV and video dialtone services is only one of degree.

7.3 Impact of Telephone Video Distribution on the Viability of the Cable Industry

The ability of the cable industry to continue to play a strong supportive role in the Canadian broadcasting system is dependent on the maintenance of its financial viability, which in turn is largely dependent on its residential video programming consumer base. These matters are addressed further in the next section of this report.

Some cable operators have raised the concern that telephone company entry into cable's core television program distribution business would undermine the cable industry's financial viability, including its ability to raise capital on reasonable terms for network upgrading.

A close look at the nature and capabilities of the telephone network indicates that this concern is unfounded. As a practical matter, the telephone industry will be unable to compete effectively in the television program distribution market, and certainly in the cable industry's core residential market, for many years to come because of the far more limited broadband distribution capability of local telephone networks.

Based on foreseeable technologies and trends in network evolution, it will not be possible for telephone companies to deliver television programs to the home on a more cost-effective basis than cable, until at least the turn of the century, and quite likely for some time thereafter.

In this regard, it must be kept in mind that the local telephone network would require billions of dollars invested over a period of many years to upgrade to video program distribution capabilities. An analogy can be found in the upgrading of analog local switching to digital which is taking several decades to implement. However, this modernization to digital switching is considerably easier than modernizing the access network to broadband capabilities.

Even if digital compression techniques became available within the next few years to permit the delivery of video signals of acceptable quality over a hybrid fibre/twisted pair telephone network, this technology would generally require the use of two copper telephone pairs per home to deliver a single video channel of adequate quality. The provisioning of two pairs to each home would in itself require a substantial upgrading of the access network.

While there is an element of risk for the cable industry in the potential for telephone company entry into the video distribution market, risk is not a new phenomenon to the cable industry, its investors and lenders. Video cassette rental outlets and high-powered DBS are likely to continue to present more potent competition to the cable industry than telephone companies. Moreover, the new technologies which raise the potential of telephone entry into television program markets also raise significant new opportunities for the cable industry. Digital transmission, video compression and fibre will permit cable to enhance the range, volume and value of the services it provides, both in the television distribution area and in areas that are competitive with the telephone companies.

In addition, the prospect of sharing and integration of some elements of the local network infrastructure with telephone companies has the potential for increasing the efficiency and decreasing the risks of cable operators. These benefits could accrue to both the cable and telephone industries.

7.4 Conditions of Telephone Entry into the Local Video Distribution Market

Generally, telephone and cable industry members of the Committee expressed opposing views on the regulatory and policy approach that should govern telephone company entry into the local video distribution market.

While most cable representatives agreed that it might be decades before the telephone industry would, as a matter of practice, be able to compete effectively in the core cable television markets, some nevertheless advocated restrictions on telephone entry into such markets. Proposed restrictions ranged from outright prohibitions or moratoria on the entry of telephone companies into the residential video market, to the development of rules against the subsidization of telephone company entry into competitive broadband markets from monopoly telephone service markets. There was also an indication from cable representatives that the relative size of the two industries should be taken into account when devising specific policies regarding competition, particularly if competition extended to the full range of local network services.

Telephone company members of the Committee generally supported the position that market forces should shape the local network market. Competition across a broad range of local network services should be permitted, they submitted, taking into account the need for safeguards to protect the affordability of local telephone service.

Telephone company members said they supported the development of a competitive market place where competitors are treated equally. The role of government, they indicated, should be limited to ensuring a fair and equitable competitive environment. This might include, for example, guarding against predatory pricing, uneconomic entry or cross-subsidization of competitive services by monopoly services. Government policy should not, they said, distort the normal functioning of the market place by instituting policies and regulations which would either prematurely promote or artificially delay a competitive environment.

Some telephone companies took the position that the threat of cross-subsidization from monopoly service would not materialize since the CRTC has mandated safeguards to ensure against this occurrence. Others suggested more specifically that Phase III of the Commission's Telecommunications Cost Inquiry would prevent cross-subsidy of broadband video services from monopoly telephone services.

In this regard, the position of these telephone companies appears to be somewhat overstated. While the Commission has developed a detailed costing methodology in Phase III, that methodology is only aimed at identifying cross-subsidies between certain broad service categories on a "snapshot" one year basis. The method does not monitor expenditures on local access plant on an ongoing basis. More importantly, the method would not separate the costs of new broadband services which utilize basic local network access facilities where those facilities are jointly used to provide POTS. While some such broadband services would likely utilize plant assigned by Phase III to the Competitive Network Broad Service Category, much of the other required plant would be assigned to the access category. Subdividing the access category to separate out facilities that are jointly used to provide POTS and local broadband services would raise new issues of costing theory and procedures, and would require additional work by the Commission and telephone companies.

Existing aggregate cost separation procedures such as the CRTC's Phase III approach, as well as future-oriented economic study approaches such as the CRTC's Phase II approach, have their limitations in dealing with the allocation of costs of facilities that are jointly used for two or more services (such as POTS and new local broadband services). The more practical question in dealing with joint costs relates not to the allocation but to the recovery of these joint costs by the various services. In the case of both advanced telephone and cable services, the regulator will continue to have regard for the interests of subscribers to basic services to ensure that they are not unduly burdened by the need to recover the costs of network upgrades that are jointly usable for basic and advanced services.

Notwithstanding the difficulties of the regulatory challenges, safeguards against cross-subsidy from monopoly telephone subscribers will have to be developed. The development of such safeguards would be fairer and more consistent with the evolution towards competitive and more advanced local network infrastructures than would a prohibition against telephone company entry into residential video markets.

The general position of telephone companies is that a prohibition against their providing residential video services would be shortsighted and unduly focused on the existing core markets of telephone and cable industries, i.e. interactive voice and data telecommunications and the distribution of television programming. Telephone companies submitted that greater emphasis should be given to potential new broadband markets, services and applications, including interactive multimedia and video services. The potential for such services to enhance the competitiveness as well as the quality of life of Canadians is significant.

Excluding telephone companies from the residential broadband market could well curtail Canadian technology development to the detriment of the telecommunications R&D and manufacturing sectors in Canada. An exclusionary policy would retard investment by both telephone companies and other Canadian firms in the development of content-based services and applications involving interactive multimedia and video communications, while this type of service innovation proceeded in other countries. Such a policy could make the Canadian domestic market more vulnerable to foreign entry and competition and reduce potential export opportunities for technologies and services.

Allowing the telephone companies to provide broadband dialtone services to the residential market as and when demand warrants it, could also stimulate the development of applications which link the residential and non-residential segments of the market. Businesses, educational institutions and governments all interact extensively with residential consumers. Moreover, the line between the residential and non-residential segments of the market is blurring with the trend in working at home and the migration of business technologies to the home. A policy which excluded the telephone companies from the residential broadband and video markets would also present barriers to communications developments which supported these trends.

Some consideration was given to developing a more limited restriction focused on telephone company entry into the residential *television program* distribution market. In theory, such a restriction would permit telephone company entry into other residential broadband markets including interactive video services. While such a restriction might arguably be consistent with current broadcasting policies, it is problematic from a technical point of view.

The definition of what is a "television" set or terminal will undoubtedly change over the coming years with the increasing penetration of multimedia terminals. Such terminals will combine the capability of traditional television sets with those of computers, stereo sound systems, security systems and other types of communications terminals used today.

Similarly, the definition of a "television program" is evolving. Educational and training videos, digital multimedia programs, and even new cable services like Vidéotron's *Videoway*, all use video "programming" material that looks like "television programming" but is distinguishable from the television programming which represents the core cable market today. Video programming will increasingly be used in more interactive and non-traditional applications that would make it difficult to classify as "television programming".

For example, a National Film Board documentary on a current social problem which is retransmitted by a cable operator from a CBC broadcast would undoubtedly be classified as television programming. However, the same documentary, or extracts from it could be called up onto a computer screen from a multimedia disc or via a broadband telecommunications line as part of a service application aimed at students in a social work course. The documentary or extracts could also be sent by a teacher to the terminals of 200 of her students across Canada. Would it then be a "television" program or a computer program?

The potential downside impact of a restriction on telephone company distribution of "television programming" would appear to outweigh any benefits it could achieve. The natural cost and technology advantages of the cable industry in its core television program distribution market will be enough to ensure that telephone industry entry into video markets will not undermine cable's role in achieving the objectives of the *Broadcasting Act*, for at least a decade, and probably much longer.

Telephone industry participation in the distribution of video and multimedia services could provide businesses, institutions and consumers with a wide diversity of new services. It could also stimulate the production of and enhance access to Canadian cultural products. Delaying the entry of the Canadian telecommunications industry into such markets could put the Canadian communications and cultural industries at a competitive disadvantage in the future.

7.5 Conclusions

Restrictions on entry into communications markets should not be aimed at protecting an industry, be it cable or telephone, from competition. They can only be justified in terms of broader public policy objectives.

Telephone companies plan to develop their local networks to distribute a variety of broadband services in addition to the narrowband services which currently provide the mainstay of their offerings. Such broadband services have the potential to improve the quality of the lives of Canadians and to significantly improve Canada's international competitiveness.

The rate of deployment of broadband capabilities by the telephone companies should continue to be governed by the demand for those capabilities in the various markets served. It is expected that the demand for interactive local broadband services will continue to develop initially in the business, government, institutional and educational markets rather than the residential market. Accordingly, it is expected that telephone companies will, in the near term, focus their investments on the upgrading of subscriber lines to broadband capability in markets other than the residential market.

Most of the types of interactive broadband services that telephone companies will be able to deliver on a cost-effective basis will pose little or no threat to the objectives of the *Broadcasting Act*. At the same time, they have the potential to keep Canadians competitive with telecommunications users around the world. The introduction of multimedia services is a case in point.

In principle, neither the cable nor telephone industries should be able to cross-subsidize their entry into competitive local network markets from their regulated monopoly core services, namely basic cable television services and basic telephone services. To permit such cross-subsidy could lead to the uneconomic overbuilding of local networks at the expense of the monopoly customers of the core services of both industries. While telephone companies have the potential to subsidize their entry into the residential video market and other markets that are competitive with the cable industry, it should continue to be the function of regulatory oversight of the upgrading of telephone company local network plant to detect and prevent such abuses. A prohibition on telephone company entry into such markets would be counterproductive.

Without a significant cross-subsidy from other sources, it will not be possible to upgrade local telephone networks to compete with the cable industry on a cost-effective basis in the residential television program distribution market, for at least a decade and, if the present trend in upgrading cable networks and services continues, possibly much longer.

Over the longer term, with the development of widespread interactive broadband capability in the local telephone network it will be possible for some types of programming services to be delivered via telephone networks that compete directly with the television programming services delivered via cable. Depending on the state of evolution of the Canadian broadcasting system at that time, delivery of unregulated programming services on telephone networks could pose a threat to the achievement of the objectives of the *Broadcasting Act*. An example is a video jukebox service which provides access to foreign television programs only, and which provides neither access nor support to Canadian programs.

If and when the delivery of programming services over the local telephone network infrastructure does pose a serious threat to the objectives of the *Broadcasting Act*, it should be possible to regulate such services adequately under the provisions of that Act. Near Video on Demand services would generally fall within the expanded definition of "broadcasting" under the Act,[58] and would therefore be subject to licensing by the CRTC. Most foreseeable forms of video dialtone services provided to the public would also fall within that expanded definition. The matter of telephone company involvement in the provision of the content of services such as video dialtone services is dealt with in the next chapter of this report, where it is recommended that such activities should only occur through corporate entities that are separate from telephone companies. If a telephone company restricts its role in the provision of video dialtone services to that of a telecommunications common carrier, it would not be subject to the *Broadcasting Act*,[59] although, in most cases, the program providers would be.[60]

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[58] *Broadcasting Act*, S.C. 1991, c. 11. Under section 2(1) of this Act, "broadcasting" includes "any transmission of programs . . . by . . . means of telecommunication for reception by the public . . ." and a "program" includes ". . . a combination of sounds and visual images . . .". Depending on their design, the operators or program providers of Near Video on Demand and video dial tone-type services could fall within the definition of a "programming undertaking" or a "distribution undertaking", both of which require a licence under the Act. A "programming undertaking" means an "undertaking for the transmission of programs, either directly by . . . means of telecommunication or indirectly through a distribution undertaking, for reception by the public . . .". A "distribution undertaking" means an "undertaking for the reception of broadcasting and the retransmission thereof by radio waves or other means of telecommunication to more than one permanent or temporary residence or dwelling unit or to another such undertaking".

Accordingly, while there should not be a restriction on the gradual market-driven entry of telephone companies into residential broadband markets, providers of programming services to the public that utilize telephone company networks should, to the extent that they threaten the achievement of the objectives of the *Broadcasting Act*, be regulated pursuant to that Act.

RECOMMENDATIONS

30. **Telephone companies should be permitted to continue to develop their local network transmission facilities to enable the distribution of a wide variety of broadband services.**

31. **The rate of deployment of broadband transmission capabilities by the telephone companies should be governed by the demand for those capabilities in the markets served, and by the cost-effectiveness of the technologies deployed.**

32. **There should be sufficient regulatory oversight of the upgrading of telephone company local network plant to detect and prevent significant abuses of the telephone companies' dominant position in local exchange markets, and particularly to prevent subsidization of the introduction of capabilities to provide competitive broadband services by users of basic telephone services.**

33. **Providers of programming services to the public that utilize the transmission facilities of telephone companies or other means of telecommunication should, to the extent that they threaten the achievement of the objectives of the *Broadcasting Act*, be regulated pursuant to and in accordance with the objectives of that Act.**

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[59] *Broadcasting Act*, section 4(4) provides: "For greater certainty, this Act does not apply to any telecommunications common carrier when acting solely in that capacity".

[60] See definition of "programming undertaking", in note 58.

CHAPTER 8

THE CARRIER/CONTENT DISTINCTION

8.0 THE CARRIER/CONTENT DISTINCTION

8.1 Background

Canadian policy and regulation governing the separation of the carriage and content functions in the cable and telephone industries have developed in a somewhat *ad hoc* and inconsistent fashion.

Only the largest of the federally regulated Canadian telephone companies, Bell Canada, is currently subject to a legislative restriction against involvement with the content of its services. Section 8 of the *Bell Canada Act* requires the company to act solely as a telecommunications common carrier where it provides transmission services or facilities. Where it does so, the section specifically prohibits the company from controlling the contents or influencing the meaning or the purpose of messages it transmits, emits, or receives. However, while no statutory provision restricts other telephone companies to a carrier role, the CRTC has, in a number of cases, taken a similar regulatory approach to them as to Bell Canada.

The new federal telecommunications bill[61] extends a restriction similar to section 8 of the *Bell Canada Act* to all federally regulated telecommunications carriers. However, clause 41 of *Bill C-62* allows the CRTC to approve exceptions to the restriction. It is thought that exceptions might relate initially to such services as gateways, electronic directories and other enhanced service offerings, but Clause 41 does not provide any guidance in this regard, and it would be up to the CRTC to develop a policy to implement the section.

Cable operators have faced a different regulatory approach to the carriage/content distinction. The large majority of the signals carried by cable operators to date have been retransmissions of over-the-air broadcast signals or of satellite-to-cable services. The carriage of these programming signals has been subject to CRTC regulations and decisions aimed at achieving the objectives of the *Broadcasting Act*. CRTC regulation determines the types of signals carried, signal priority, program substitution, and subject to the regulations prohibits cable operators from altering the content of the services retransmitted by them.

In addition, cable operators have traditionally been encouraged, and indeed required, to participate in the development of a community channel. Cable operators have thus, from the early days of their industry, had a role in the development of the content of at least one of the signals they transmit.

Additional cable operator involvement in programming content has been permitted over the last few decades, largely on a case by case basis. The owners of a number of cable licensees also have equity interests in television and radio broadcasters as well as in satellite-to-cable specialty services. While the latter type of cross-ownership in specialty services is far less extensive in

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[61] Clause 41 of *Bill C-62*.

Canada than it is in the U.S., it may be expected to increase. In fact, the origination of programming by cable operators has recently been sanctioned in the new *Broadcasting Act*, although subject to some conditions.[62]

Non-programming services offered by the cable operators are not subject to regulation under the *Broadcasting Act*, and there are currently no restrictions against the participation of cable operators in the content of such services. Some, if not most, of the non-programming services currently offered by cable operators compete with telephone company offerings, with other communications media such as newspapers, or with services of other industries. The content of some of the cable non-programming services is developed by cable operators. In a limited number of other cases it is developed by, or in cooperation with, third parties. Such third parties include newspapers, government agencies, real estate brokers, security alarm businesses and others.

There are currently industry-established cost separation guidelines aimed at assuring the CRTC that cable operators do not subsidize their non-programming services from their regulated program distribution business. The guidelines are somewhat less rigorous and employ a different approach from those governing the separation of competitive and monopoly telephone service categories under Phase III of the CRTC's Telecommunications Cost Inquiry.

There are no legislative provisions and no explicit regulatory rules preventing cable operators, in their role as carriers of non-programming services, from discriminating against other providers of non-programming services that may want access to cable networks to distribute their services. In fact, few cable operators provide such access. While this regulatory approach stands in marked contrast to the regime applicable to the telephone industry in the provision of similar services, it has been justifiable largely because cable participation in the non-programming services market has been quite limited to date, at least compared to their core television program distribution business.

The divergent regulatory approach to telephone companies and cable operators reflects the different legal framework and regulatory policies which have historically governed the telecommunications carrier and broadcasting industries in Canada. Telecommunications carrier law and regulation focus on the common carriage role (especially rates and terms of access) and prevent carriers from controlling or influencing content. Broadcasting law and regulation seek to ensure the implementation of social and cultural objectives, and treat non-programming services as a minor adjunct to cable's main business.

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[62] Section 3(1)(*t*)(iv) provides that distribution undertakings "may, where the Commission considers it appropriate, originate programming, including local programming, on such terms as are conducive to the achievement of the objectives of the broadcasting policy set out in this subsection, and in particular provide access for underserved linguistic and cultural minority communities".

Regulatory supervision and restrictions on telephone company participation in the provision of the content of information services has increased in recent years with the introduction of new electronic gateway, directory, publishing and information services and with the increasing potential for competition in the provision of these services. By contrast, the provision of non-programming services by cable operators has remained largely unrestricted, notwithstanding that some of their services are becoming increasingly competitive with telephone company offerings.

Canadian policies and regulation affecting the carriage/content distinction in local network markets should not only support the development of an efficient and fair competitive market, but also a number of the other criteria identified in Chapter 1 of this report. In particular, the policy and regulatory environment should support the production of and access to Canadian cultural products, the development of advanced services and the competitiveness of the Canadian economy in the information age.

Under the current policy and regulatory environment, local network operators have recently introduced a variety of new information and entertainment services. These services include a wide variety of types of products and distribution media. Examples range from Vidéotron's Videoway and Bell Canada's Alex services to the Toronto Star's Starphone, CBC's Newsworld, *The Sports Network* and many others.

Opinion is divided on the competitiveness of the Canadian information products and services sector, particularly in view of the widespread access by Canadians to an avalanche of such products produced by our large southern neighbour. As the information economy continues to penetrate various sectors of Canadian life, it becomes increasingly important to provide a policy and regulatory environment that stimulates the development of competitive information and entertainment products and supports their economic viability.

8.2 The Degree of Carrier/Content Separation

The Committee considered the type of policy and regulatory structure that would best foster the development of Canadian video entertainment and information products. Among the issues discussed was the question of whether greater telephone or cable operator participation would increase investment in new and innovative services, such as multimedia services. Questions arose in this context regarding whether telephone companies should be permitted to provide or package the content of various types of services. Other questions related to whether cable operators should participate to a greater extent in the provision of television program content.

Opinion was divided among Committee members on these and related issues. Generally, telephone company members opposed restrictions which prevent them from providing the content of services they transmitted. In the absence of such restrictions, they submitted, telephone company participation would stimulate and encourage innovation in information and entertainment services.

For example, telephone company entry into the provision of the content of information services was seen as enhancing the growth potential of new information services such as classified advertising, home shopping, educational applications, electronic banking, stock information and trading, and electronic Yellow Pages™. Such information services could be provided over the existing transmission infrastructure with few changes.

At the Committee's meetings, some traditional opponents of any participation by telephone companies in the provision of content accepted the principle of a limited degree of telephone company participation. This development appeared to be based on a recognition that the involvement of telephone companies could open new avenues for the production of content. However, the view was expressed by others that there should be stricter separation of carriage and content in the future, and that both telephone companies and cable operators should be excluded from participating in the origination of program or information service content.

Members of the Committee generally agreed that providers of content-based services should be entitled to non-discriminatory access to local distribution networks. It was pointed out that current legislation governing federally regulated telephone companies requires the provision of non-discriminatory access to competitors and prevents them from granting themselves an undue preference in the provision of competitive services. In addition, the legislation requires that they must not provide network access to themselves or to any affiliated companies on terms that are unreasonably prejudicial to competitors. These existing safeguards, it was argued, would continue to be adequate for telephone companies that provide information services directly or through an affiliate.

While the principle of non-discriminatory access was also generally endorsed by cable industry representatives, they preferred to discuss the issue in terms of fair and equitable access, taking into account the characteristics of the cable industry and its policy environment. Account should be taken, they said, of the limited channel capacity on cable systems and the point-to-multipoint characteristic of cable communications.

It was also suggested that a cable operator should be able to refuse to carry content that is illegal, obscene or offensive to subscribers. It was also submitted by cable representatives that any rules regarding access to cable channels should ensure that the cable operator should be able to select the services that would be most attractive to its market from the variety of services available, and that cable operators should have the right to drop a service in the event that subscribers are dissatisfied with it.

8.3 Conclusions

Telephone companies could play an important role in increasing the amount and diversity of multimedia and video programming, electronic publishing and other information content distributed on their networks and elsewhere. Although they have relatively little experience in this area, telephone companies and their affiliates have the financial strength and a significant financial interest in stimulating greater use of their "electronic highways". The telephone industry could provide a new source of financing for the Canadian multimedia, video and electronic publishing industries.

Telephone companies should remain subject to a legislative prohibition against unjust discrimination similar to that now found in section 340(2) of the *Railway Act*, and the CRTC should continue to enforce this provision to ensure that telephone companies do not grant themselves or affiliated "content" providers an unreasonable preference in relation to distribution of services.

Many cable operators already participate to a limited extent in the production of the programming services distributed on their systems, either directly, on their community channels, or indirectly, through affiliated television broadcasters, specialty services, production houses and in other ways. These cable investments have helped to produce a wider diversity of programming than would otherwise have been available in Canada.

For the next decade or more, it is likely that the telephone and cable industries will each retain a dominant position over the segments of the local telecommunications network infrastructure that they operate. Therefore it is appropriate to maintain or develop safeguards against abuses of their dominant position, in order to foster a fair competitive market for the supply of content-related services. These safeguards should be designed to balance potential problems with the advantages of involving each of the industries in the content-related aspects of markets in which they already have considerable experience.

In order to balance these factors, it is recommended that telephone company investments in service providers in the multimedia, video, electronic publishing and similar "content" industries should, at least initially, be limited to less than 50% of the voting interests in such service providers, and that telephone companies should not be permitted to hold *de facto* control over such service providers. This level of ownership should provide a sufficient incentive to permit the telephone industry and the content industry to benefit from their mutual involvement, without raising undue concerns about carrier control over content. Such a restriction on the level of telephone company ownership should also ensure that the telephone companies would retain a real incentive to carry the content of unaffiliated information and video service providers on a non-discriminatory basis, whether or not they competed with the telephone company-related providers.

Cable systems that carry non-programming telecommunications services should provide access to their facilities to other providers of such services on a reasonable basis, bearing in mind the circumstances of the cable operator in question. It was acknowledged that certain restrictions on access were inevitable due to bandwidth limitations of cable systems at various times in their evolution. However, when such circumstances arise, a cable operator should not, in the future, give undue preferences to the services in which it has an investment interest. Regulatory scrutiny of cable non-programming services should increase as they become more than an incidental part of cable operators' businesses.

RECOMMENDATIONS

34. **As a general rule, Canadian policy and regulation should maintain the principle of the separation of the carriage and content functions in the delivery of local network services. However, the telephone and cable industries should both be permitted to participate in the provision of content-based services carried on their networks, particularly to develop services that would not otherwise emerge or to support the achievement of the objectives of the *Broadcasting Act*. Telephone and cable industry participation in the supply of content-based services should be subject to regulatory safeguards to maintain a fair and competitive market place.**

35. **Telephone industry investments in programming and in the provision of the content of other information services should generally be made through separate affiliates. Subject to established exceptions such as the cable community channel, cable industry investments in programming and information service content should, in the future, also be made through separate affiliates.**

36. **Telephone company investments in information services affiliates (such as multimedia, video, electronic publishing and similar "content" services) should, at least for an initial five-year period, be limited to a minority ownership position. During this period, telephone companies should not be permitted to exercise control in fact over such affiliates.**

37. **The separate affiliate requirements proposed above should not apply to:**

    (a) **the provision by telephone companies of enhanced telecommunications services other than information services; or to**

    (b) **the provision of non-programming services by cable operators,**

    unless the CRTC considers that the provision of such services through a separate affiliate to be an effective means of ensuring that such operations are provided on a non-discriminatory basis and without undue cross-subsidy from monopoly telephone services or cable programming services, respectively. The CRTC should be granted legislative authority to make the

appropriate divestiture orders in cases where such authority is not already in place.[63]

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[63] Such authority already exists in the case of Bell Canada, and is proposed to be extended to the rest of the federally regulated telecommunications carrier industry through clause 40 of *Bill C-62*.

CHAPTER 9

TABLE OF RECOMMENDATIONS

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CHAPTER 3 — THE EFFICIENCY OF THE INFRASTRUCTURE

1. In the absence of evidence that there would be overall economies of scope in the joint provision of telephone and cable services over a single local network infrastructure, government policy and regulation should not promote the full integration of local network infrastructures.

2. Government policy and regulation should not prevent the sharing and integration of different elements of the local cable and telephone infrastructure, as and when such integration is more efficient than the use of separate facilities.

3. Since it is not possible to predict or prescribe where or how all of the economies of integration will occur, the policy and regulatory environment should be flexible enough to permit local network operators to implement cost-effective means of integrating elements of their infrastructures. Such arrangements should be implemented in a manner that is consistent with the development of a more efficient local network market place and with the other objectives of Canadian communications policy.

4. In view of the changing technological and market environment of the local network infrastructure, government policies and regulation which affect the evolution of that infrastructure should be reviewed on a periodic basis, to determine whether they are still appropriate, and in particular, whether they unnecessarily restrict the development of the market place.

5. Regulatory supervision should continue to ensure that increasing competition and anti-competitive strategies do not cause either cable operators or telephone companies to refuse to implement approaches to network integration, interconnection or cooperation that would improve the efficiency of the local network infrastructure.

CHAPTER 4 — OWNERSHIP OF THE LOCAL NETWORK INFRASTRUCTURE

6. Since the potential for increased efficiency and improved service will often be greater in less densely populated areas,

   (a) cable operators and telephone companies serving such areas should, in particular, pursue opportunities for increased efficiency or better service through sharing and integration of elements of the local network infrastructure; and

   (b) cable operators and telephone companies serving such areas should, in consultation with their employees and their unions, pursue opportunities for increased efficiency through shared or integrated administration, maintenance and similar functions related to the ongoing operation of their networks.

7. Canadian policy and regulation should continue to promote the sharing of support structures by telephone companies, cable operators and other support structure providers. In this regard, the concept of support structures should be defined more broadly in the future, taking into account new technologies such as fibre optic cables, for which sharing arrangements can improve the efficiency of the local network infrastructure.

8. Government policy and regulation should not prevent the development of joint ventures between telephone companies and cable operators that are aimed at achieving more effective and efficient sharing of support structures.

9. Telephone companies and cable operators should, in conjunction with electrical power utilities, and other providers of support structures, establish better cooperative mechanisms to plan the shared construction and use of support structures. Where necessary, regulators should intervene to ensure that such cooperative mechanisms are developed and implemented and that they function effectively.

10. Cable operators should have the same rights of access to public rights-of-way as federally regulated telephone companies in circumstances where suitable support structures are not available to them on reasonable terms and conditions from telephone companies, electric power utilities or other providers of support structures.

11. Cable operators should be permitted to enter into arrangements to use subscriber drop facilities that are wholly or partly owned by another person, including a telephone company. However, such arrangements should be subject to safeguards

to retain a competitive local infrastructure and to ensure that the objectives of the *Broadcasting Act* are not frustrated. These safeguards should include the following:

(a) The cable licensee must agree to the arrangement in writing.

(b) The written agreement should be approved by the CRTC (this may be accomplished by way of "type approval" of agreements).

(c) The arrangement must be more efficient or otherwise beneficial to consumers.

(d) The Commission should be assured that service will be provided at a level equal to or better than current industry standards, and that the arrangement will not prevent the achievement of the objectives of the *Broadcasting Act*.

(e) Preference should be given to arrangements for the joint ownership of subscriber drops between the cable operator and other parties such as telephone companies rather than one by which the other party owns the drop facility outright and merely leases it to the cable operator.

(f) The arrangement should not include any restrictions on the use of the drop facilities beyond those required for technical and safety considerations or reasons of operating efficiency.

(g) The agreement should include a written representation that the provision of cable drops or other facilities to the cable operator was not a condition for the provision (or the provision on more favourable terms) to the cable operator of other transmission facilities such as partial systems, support structures, access to premises or other facilities or services necessary for the operation of a cable system.

(h) The cable operator should have the right to terminate the lease of the facilities on reasonable terms, bearing in mind the right of the facilities owner to obtain fair compensation for its capital costs.

12. The requirement that a cable licensee must own its amplifiers should be abolished.

13. Cable head ends should continue to be owned and directly controlled by cable operators.

14. Government policy and regulation should not prevent the sharing of head end facilities among cable operators where it is cost-effective to do so or where doing so would enable cable operators to provide a wider range of services or otherwise better achieve the objectives of the *Broadcasting Act*.

15. The "anti-leaseback" prohibition associated with the "scope clause" should be abolished in order to remove a potential barrier to the cost-effective sharing of local network facilities. However, neither a telephone company nor a cable operator should have the right to impose restrictions on the use of transmission facilities leased to the other, except restrictions reasonably required for technical, efficiency or safety reasons.

CHAPTER 5 — DEVELOPING ADVANCED LOCAL BROADBAND NETWORKS

16. Government policy and regulation should permit the timely and cost-effective upgrading of the cable television network infrastructure in order to maintain the cable industry's competitive position vis-à-vis alternate means of television program distribution which undermine the objectives of the *Broadcasting Act*.

17. Government policy and regulation should permit the upgrading of the telephone network infrastructure to enable it to provide Canadian business, government, educational and residential consumers with advanced telecommunications services that are competitive with those available in other industrialized countries.

18. Telephone and cable industries should be permitted to cooperate, share and integrate their facilities wherever it would accelerate the introduction of more cost-effective advanced local networks and particularly where it would enhance the cable industry's ability to achieve its *Broadcasting Act* objectives. However, such cooperative initiatives should be structured so as to maintain a competitive service environment between the two industries.

19. Research and development of cable/telephone integration technologies should be given a high priority in industry and government R&D programs.

20. Canadian policy and regulation should not adopt an industrial strategy of accelerating the deployment of fibre lines to every home and office at a faster rate than is justified by market demand.

21. Canadian industry and government should cooperate to develop or adopt standards for the integration and interconnection of telephone, cable and other communications networks. This standards development activity should be industry-led. However, government should participate to ensure that public policy objectives are met, including the maintenance of an effectively competitive local network environment, and to mediate disputes.

22. Canadian government and industry participation in the work of international standards committees and R&D organizations should be expanded to include areas related to the integration and interconnection of telephone, cable and other communications networks.

23. The Canadian cable industry should, with the support of the Department of Communications, develop standards for upgrading cable networks with the following objectives:

- increasing the compatibility and service life of cable technologies installed by various operators across the country;
- reducing the costs and increasing the efficiency and capabilities of cable technologies installed by all cable operators; and
- facilitating future interconnectivity, and where it is more efficient, greater integration, of cable facilities with those of telephone companies and other communications networks.

24. Standards that are developed for the integration and interconnection of telephone and cable networks with each other and with other communications systems should be consistent with the application of the Open Network Architecture (ONA) concept. Under this approach, over time, the operators of the two networks as well as other suppliers and users of communications services should be able to increase their efficiency by accessing and using only the specific elements of the local network infrastructure that they require.

CHAPTER 6 — TELEPHONE/CABLE CROSS-OWNERSHIP

25. In general, neither telephone companies nor their affiliates should be permitted to directly or indirectly own or control cable systems located within their service area or the service area of an affiliate. For these purposes, Stentor member companies should be considered affiliates of each other. Similar ownership restrictions should apply to investments in the local wireline network operations of telephone companies by cable operators and their affiliates.

26. Telephone companies and their affiliates should be permitted to hold up to a 30% minority interest in any cable system operating within the same service area, provided it is clear that the telephone companies will not exercise control in fact over the cable system and that telephone company ownership will not otherwise prevent the cable system from competing with the telephone company.

27. Telephone companies and their affiliates should be permitted to own cable systems operating in remote and underserved parts of their service areas (areas equivalent to those served by the CRTC's Part III systems).

28. Subject to the foregoing recommendations, there should be no restrictions against ownership of cable systems by telephone companies. Generally similar rules should apply to the ownership by cable operators and their affiliates of interests in local wireline telephone networks as those applying to telephone company ownership. No restrictions should apply to the ownership of cable or telephone operations located out of the service area of a cable or telephone company or its affiliates.

29. Government policy and regulation should not prevent the joint ownership by telephone companies and cable operators of separate entities that would own and operate elements of the local transmission infrastructure, where the establishment of such entities would be a more efficient means of providing service, particularly in less densely populated areas.

CHAPTER 7 — TELEPHONE COMPANY ENTRY INTO LOCAL BROADBAND MARKETS

30. Telephone companies should be permitted to continue to develop their local network transmission facilities to enable the distribution of a wide variety of broadband services.

31. The rate of deployment of broadband transmission capabilities by the telephone companies should be governed by the demand for those capabilities in the markets served, and by the cost-effectiveness of the technologies deployed.

32. There should be sufficient regulatory oversight of the upgrading of telephone company local network plant to detect and prevent significant abuses of the telephone companies' dominant position in local exchange markets, and particularly to prevent subsidization of the introduction of capabilities to provide competitive broadband services by users of basic telephone services.

33. Providers of programming services to the public that utilize the transmission facilities of telephone companies or other means of telecommunication should, to the extent that they threaten the achievement of the objectives of the *Broadcasting Act*, be regulated pursuant to and in accordance with the objectives of that Act.

CHAPTER 8 — THE CARRIER/CONTENT DISTINCTION

34. As a general rule, Canadian policy and regulation should maintain the principle of the separation of the carriage and content functions in the delivery of local network services. However, the telephone and cable industries should both be permitted to participate in the provision of content-based services carried on their networks, particularly to develop services that would not otherwise emerge or to support the achievement of the objectives of the *Broadcasting Act*. Telephone and cable industry participation in the supply of content-based services should be subject to regulatory safeguards to maintain a fair and competitive market place.

35. Telephone industry investments in programming and in the provision of the content of other information services should generally be made through separate affiliates. Subject to established exceptions such as the cable community channel, cable industry investments in programming and information service content should, in the future, also be made through separate affiliates.

36. Telephone company investments in information services affiliates (such as multimedia, video, electronic publishing and similar "content" services) should, at least for an initial five-year period, be limited to a minority ownership position. During this period, telephone companies should not be permitted to exercise control in fact over such affiliates.

37. The separate affiliate requirements proposed above should not apply to:

    (a) the provision by telephone companies of enhanced telecommunications services other than information services; or to

    (b) the provision of non-programming services by cable operators,

    unless the CRTC considers that the provision of such services through a separate affiliate to be an effective means of ensuring that such operations are provided on a non-discriminatory basis and without undue cross-subsidy from monopoly telephone services or cable programming services, respectively. The CRTC should be granted legislative authority to make the appropriate divestiture orders in cases where such authority is not already in place.

APPENDIX A

AN OVERVIEW OF THE MAJOR CANADIAN LOCAL TELECOMMUNICATIONS NETWORK OPERATORS

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AN OVERVIEW OF THE MAJOR CANADIAN LOCAL TELECOMMUNICATIONS NETWORK OPERATORS

1.0 INTRODUCTION

This Appendix provides an overview of the Canadian local telecommunications network operators. Section 2.0 describes the development of telephone networks in Canada, the structure of the telephone industry and the recent trends toward liberalization of telephone company markets and services. Section 3.0 describes the development of the cable industry in Canada, its current role as the main delivery vehicle for broadcast signals to the home, and its increasingly important role as a contributor to the Canadian broadcasting system. Section 4.0 provides a comparative examination of the telephone and cable industries. Section 5.0 provides an overview of alternative or supplementary local network systems, that is those other than the local "wire and cable" networks of the telephone and cable industries.

2.0 THE CANADIAN TELEPHONE INDUSTRY

2.1 The Development of Canada's Telephone Industry

Canada's telephone industry can be traced back to 1876 when Alexander Graham Bell, inventor of the telephone, completed the world's first long-distance call from Brantford to Paris, Ontario. In 1878 the first telephone exchange was opened in Hamilton, Ontario. The first commercial long-distance line ran from Hamilton to Dundas. Two years later, the Bell Telephone Company of Canada (now Bell Canada) was chartered to provide telephone service to all of Canada. Bell Canada quickly extended its operations into every province except British Columbia, where private telephone companies came into operation in 1880.

Bell Canada's interests in Alberta, Manitoba and Saskatchewan were subsequently taken over by provincial governments (between 1906-1909). By the early decades of the 20th century a wide variety of telephone companies operated separate networks throughout the country. More recently there has been a trend towards somewhat greater concentration of ownership of the industry with Bell Canada playing an increasingly central role.

During the early years of the telephone industry, some long-distance calls between Canadian cities were routed through the U.S. because there were no long-distance lines across Canada. The harsh climate, small and scattered population and the vast distances made interconnection between the various telephone systems in Canada difficult. In 1931, seven major Canadian telephone companies signed a connecting agreement and formed an unincorporated association called the TransCanada Telephone System (TCTS). TCTS was formed to construct and maintain a Canadian transcontinental long-distance telephone network.

The original members of TCTS were: Maritime Telegraph and Telephone Company Limited (MT&T), the New Brunswick Telephone Company Limited (NB Tel), the Bell Telephone Company of Canada (later Bell Canada), Manitoba Government Telephones (later Manitoba Telephone System or MTS), Saskatchewan Government Telephones (later Saskatchewan Telecommunications or SaskTel), Alberta Government Telephones (AGT; recently TELUS Corporation) and British Columbia Telephone Company (B.C. Tel).

Two additional members joined in 1957 and 1975, respectively, Newfoundland Telephone Company Limited (formerly Avalon Telephone Company Limited) and the Island Telephone Company Limited. Telesat Canada, Canada's sole national satellite carrier joined the organization in 1977. Québec-Téléphone, an independent telephone company operating in parts of Quebec, joined as an associate TCTS member in 1980.

In 1983, TCTS changed its name to Telecom Canada. On January 29, 1992, the members of Telecom Canada announced a further re-organization, renaming the consortium Stentor Canadian Network Management (Stentor). According to the announcement, Stentor Canadian Network Management will "manage and monitor the telephone companies' inter-provincial networks and their North American interconnections . . . and ensure the efficient division of revenues from national services."[1] Canada's nine major telephone companies also announced the creation of two jointly-held companies — Stentor Resource Centre Inc. and Stentor Telecom Policy Inc.

Stentor Resource Centre Inc. will begin operations in January 1993. This company "will develop and deliver national telecommunications products and services, will develop technology standards, will conduct or sub-contract research and development projects for the telephone companies and will establish international alliances with other telecommunications organizations."[2]

Stentor Telecom Policy Inc. began operation in February 1992. This company acts as a government relations advisory and advocacy arm for the Stentor telephone companies.

In addition to the Stentor members, 49 independent telephone companies, including Québec-Téléphone, own and operate smaller telephone systems in various provinces and territories. Thirty of these companies are located in Ontario and 16 are in Quebec. Alberta has one large independent telephone company, ED TEL a municipally owned utility that provides service to the city of Edmonton. The remaining two independents are Prince Rupert City Telephones, operating in the city of Prince Rupert, British Columbia, and NorthwesTel Inc. (now owned by BCE Inc.) operating in the Northwest Territories, Yukon and northern British Columbia. As illustrated in Figure 2, the independent telephone companies account for approximately 7% of industry revenues.

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[1] Stentor, *Canadian Telephone Companies Introduce Stentor: The Power of Telecommunications*, (Ottawa: Bell Canada, January 29, 1992), p. 2.

[2] *Ibid.*, p. 1.

2.2 Ownership of Telephone Companies

The majority of Canadian telephone companies are Canadian-owned. Seven of the nine Stentor member companies are investor-owned, while SaskTel and MTS are owned by provincial governments (see Figure 1).

Bell Canada is by far the largest member of Stentor, accounting for approximately 60% of Stentor's telephone operating revenues. Bell Canada is a wholly-owned subsidiary of BCE Inc., which in turn is owned by a widely diversified group of shareholders, the large majority of which are Canadian.

BCE also has significant direct and indirect equity interests in the principal telephone companies in each of the four Atlantic provinces and in a number of the independent telephone companies in Ontario, Quebec, the Northwest Territories and the Yukon.

The Anglo-Canadian Telephone Company, a wholly-owned subsidiary of U.S.-based GTE Corporation, controls B.C. Tel, the second largest telephone company in Canada.

Alberta Government Telephones was privatized in 1990 and restructured as a new holding company, TELUS Corporation. AGT Limited, the related operating company that now provides telecommunications services, is the largest subsidiary of TELUS. The Government of Alberta sold the shares of TELUS to the public (between 1990-2) with a condition that no purchaser could obtain more than 5% of total shares issued.

The 49 independent telephone companies are either investor-owned companies, or municipal systems. The latter category includes ED TEL, Thunder Bay Telecommunications and Prince Rupert City Telephones.

2.3 Concentration of the Telephone Industry

In 1990, the nine Stentor telephone companies generated 93% of total operating revenues of the telephone industry in Canada.[3] Bell Canada accounted for 56% of the total operating revenues of the telephone industry in 1990.[4] B.C. Tel and Bell together account for approximately 70% of industry revenues.[5] Over 92% of total network access lines are provided by the Stentor member companies (see Figure 2). Bell Canada provides 57.5% and B.C. Tel 12.5% (see Figure 2).

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[3] Company annual reports, CRTC, Statistics Canada, Communications Canada; data for the year ended December 31, 1990.

[4] *Ibid.*

[5] *Ibid.*

Figure 1

Major Local Wireline Telephone Carriers, by Ownership, Type and Regulation

Company	Ownership	Regulation
AGT Ltd.*	Private - TELUS Corp. (widely held)	CRTC
Bell Canada*	Private - 100% BCE Inc. (No dominant owner)	CRTC
British Columbia Telephone*	Private - 52.4% Anglo-Canadian Telephone Company of Montreal (subsidiary of GTE Corporation - U.S.A.)	CRTC
ED TEL	Public - Municipality of Edmonton	Edmonton City Council
Island Telephone*	Private - 52.4% BCE Inc. & a subsidiary of MT&T	CRTC
Manitoba Telephone System*	Public - Crown corporation of Manitoba	Manitoba
Maritime Telegraph & Telephone Company Ltd.*	Private - 33.8% BCE Inc.	CRTC
NBTel*	Private - 31.4% of BCE Inc. parent Bruncor Inc.	CRTC
Newfoundland Telephone Company Ltd.*	Private - 55.7% of BCE Inc. parent NewTel	CRTC
NorthwesTel	Private - 100% BCE Inc.	CRTC
Northern Telephone	Private - 99.9% BCE Inc.	Ontario
Québec Téléphone	Private - 50.7% Anglo-Canadian Telephone Company of Montreal (subsidiary of GTE Corporation - U.S.A.)	Quebec
SaskTel*	Public - Crown corporation of Saskatchewan	Sask.
Télébec	Private - 100% BCE Inc.	Quebec
Thunder Bay Telecommunications	Public - Municipality of Thunder Bay	Ontario

* A member of Stentor

Sources: Financial Analysis, Telecommunications Directorate, CRTC, 1990.

2.4 Penetration of Basic Telephone Service

In 1991, 98.1% of all Canadian households had basic telephone service. As Figure 3 illustrates, penetration was over 90% in all ten provinces.

2.5 Other Suppliers of Telecommunications Services

A number of other telecommunications carriers own and operate facilities which provide services to the Canadian public.

Unitel Communications Inc., which has its origins in Canada's telegraph system, offers competitive local and long-distance private line and data services throughout the country.[6] Unitel operates its own microwave and fibre optic transmission systems and switching centres but generally uses telephone company local access facilities. Unitel has recently been authorized by the CRTC to interconnect its network with the local exchange facilities of most of the Stentor member telephone companies in order to provide competitive public long-distance telephone services.

B.C. Rail, which operates a microwave system along its rail right-of-way from a terminus in North Vancouver to Fort Nelson, British Columbia, provides dedicated voice and data telephone services in British Columbia which are similar to those provided by Unitel since 1979. BCRL, a joint venture of B.C. Rail and Lightel, has also recently received authority in principle to provide competitive long-distance public telephone services.

Cantel Inc. provides cellular mobile radiotelephone service in competition with CellNet Canada. CellNet Canada is an association of telephone company-owned cellular operators. Cellular companies began to offer their services in 1985 in Montreal and Toronto, and today, cellular service is available in all provinces.

Some 200 licensed radio common carriers provide various mobile radio and radio-paging services, mainly in urban areas of Canada. These services also compete with various mobile telecommunications services offered by telephone companies. The CRTC has authorized the interconnection of one-way paging systems and two-way mobile systems with the public telephone network.

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[6] A merger of the operations of Canadian National Telecommunications and Canadian Pacific Telecommunications created CNCP Telecommunications in 1980. CNCP was then operated as a partnership by Canadian National Railway and Canadian Pacific Limited. In 1988, Canadian Pacific Limited purchased Canadian National's partnership interest in CNCP. Rogers Communications Inc. then acquired a 40% equity interest in CNCP in 1989, and CNCP was subsequently renamed Unitel Communications Inc.

Figure 2

Major Canadian Telephone Companies

For the year ending December 31, 1990

1990
(in thousands of units)

COMPANIES	ESTIMATED NUMBER OF TELCO NETWORK ACCESS SERVICES	
	network access service	% of Total
AGT	1095	7.2%
B.C. TEL	1912	12.5%
Bell Canada	8798	57.5%
Island Tel	66	0.4%
MTS	601	3.9%
Maritime Tel & Tel (MT&T)	495	3.2%
NB Tel	399	2.6%
Newfoundland Tel	241	1.6%
SaskTel	562	3.7%
Subtotal Stentor Members	14169	92.6%
ED TEL	380	2.5%
Northern Telephone	58	0.4%
Northwestel	44	0.3%
Québec Téléphone	255	1.7%
Télébec	159	1.0%
Other 44 Independents	231	1.5%
Subtotal 49 Independents	1127	7.4%
TOTAL TELEPHONE COMPANIES	15296	100.0%

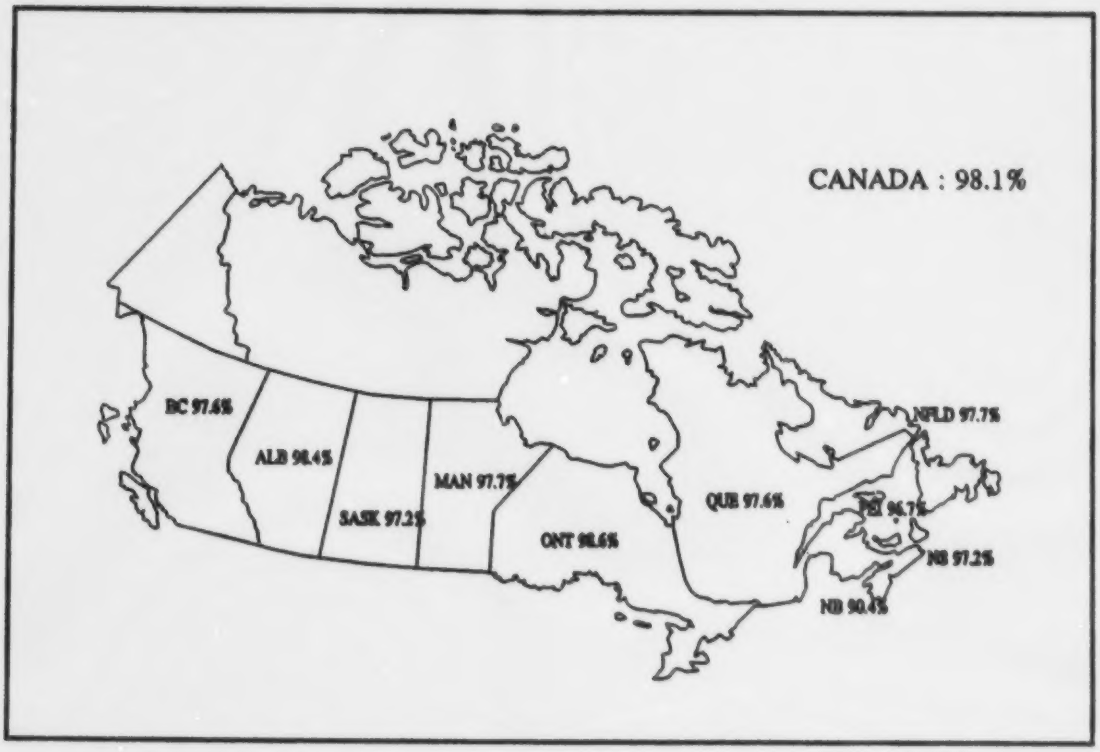
Source: Company annual reports, CRTC, Statistics Canada, Communications Canada

* definition of network access service, per Statistics Canada:

provides primary connection to a company-owned network for the purpose of telecommunications, regardless of the physical charateristics of the link. This includes individual and party line circuits; trunks connecting company facilities with switching devices located on customers' premises; licensed radio-telephones; primary connections within networks (i.e. drops); WATS; and primary special services circuits.

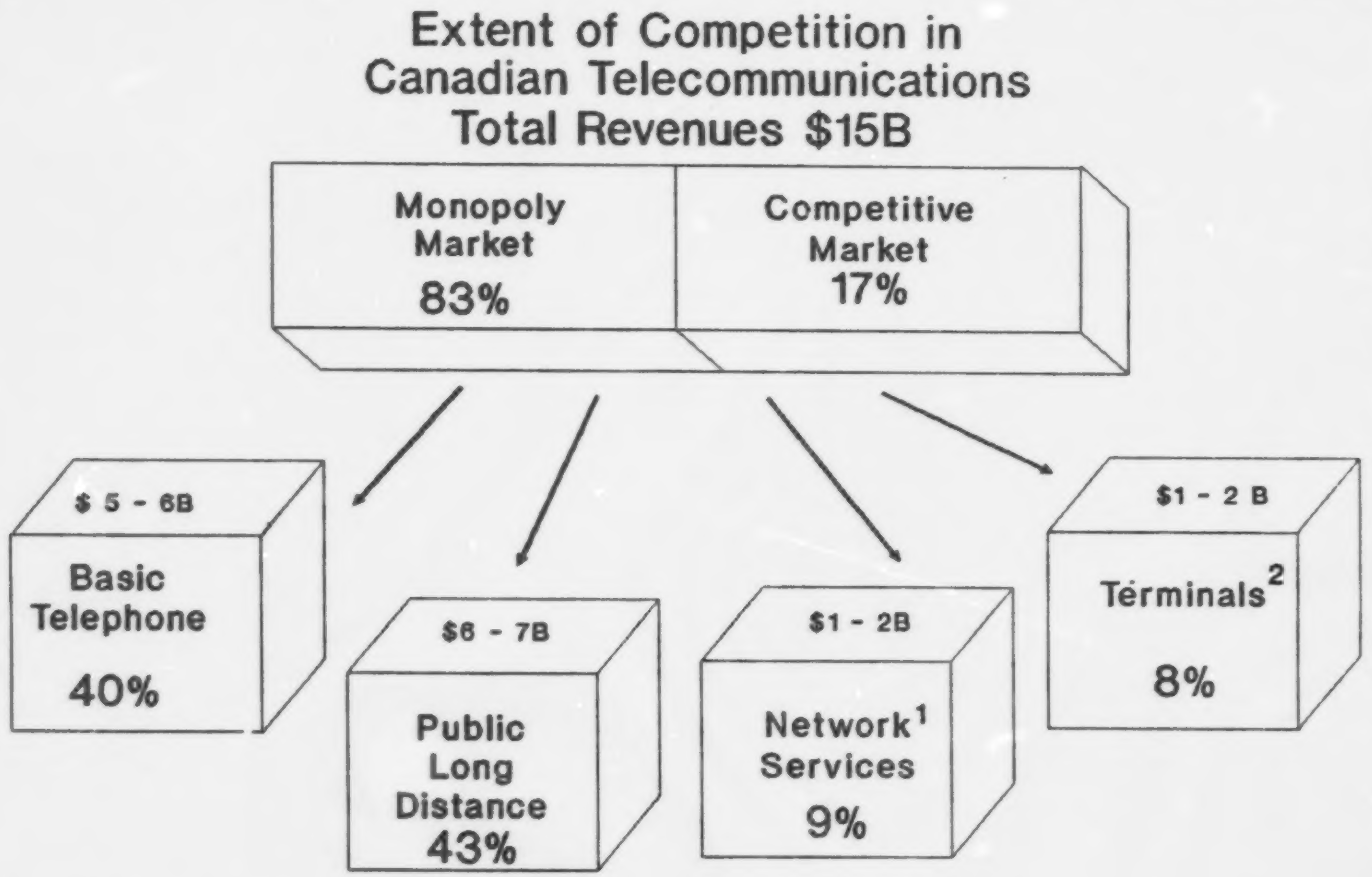
Figure 3

Percentage of Canadian Households with Telephones


CANADA : 98.1%
BC 97.6%
ALB 98.4%
SASK 97.2%
MAN 97.7%
ONT 98.6%
QUE 97.6%
NFLD 97.7%
PEI 96.7%
NS 97.2%
NB 98.4%

SOURCE: STATISTICS CANADA ANNUAL SURVEY, 1991.

Figure 4


Extent of Competition in
Canadian Telecommunications
Total Revenues $15B
Monopoly Market 83%
Competitive Market 17%
$ 5 - 6B
Basic Telephone 40%
$6 - 7B
Public Long Distance 43%
$1 - 2B
Network¹ Services 9%
$1 - 2 B
Terminals² 8%

Source: Communications Canada, based on Phase III Cost Inquiry 1990 Actual Results

Notes: 1. *This estimated market share includes network services offered by telecommunications carriers, including telephone companies.*

2. *This estimated market share includes terminals sold by telecommunications carriers, including telephone companies, as well as numerous equipment manufacturers.*

2.6 Increasing Competition in the Telecommunications Equipment and Services Markets

In the last dozen years, a series of regulatory decisions by the CRTC has liberalized the telecommunications equipment and services markets, and facilitated the entry of new suppliers in key segments of the markets. The result has been increased competition. In 1990, competitive markets such as private line voice and data services, enhanced services, cellular telephone services and terminal equipment accounted for approximately 17% of the total $15 billion telecommunications services market (see Figure 4).

In 1980, the CRTC first authorized customers to interconnect a wide variety of telephone sets and other customer-provided terminal equipment to the facilities of federally regulated telephone companies. Network interconnection to provide telecommunications services on a competitive basis began in 1979, when the CRTC permitted Unitel (then CNCP Telecommunications) to interconnect its intercity network to Bell Canada's local exchange networks.[7] A similar decision in 1981 allowed Unitel to interconnect to B.C. Tel's networks.

In 1985, the CRTC permitted the sharing and resale of facilities-based services provided by Bell Canada, B.C. Tel, Unitel and Telesat Canada.[8] In 1990, the CRTC substantially liberalized the previous rules, permitting the resale of private line facilities and services of the carriers to provide service more directly competitive with public long distance telephone services.[9] On June 12, 1992, the CRTC further modified the rules by extending resale and sharing to the Atlantic provinces and removing the prohibitions on resale of discount services such as WATS.[10] There are approximately 40 resellers in Canada that lease bulk facilities from telecommunications carriers.

In 1984, the CRTC approved the interconnection of cellular networks as well as conventional public and private mobile radio systems to the public switched telephone network of the federally regulated telephone companies.

On June 12, 1992, the CRTC announced its decision to allow Unitel Communications Inc. (Unitel), and possibly other competitors, to provide competitive long distance telephone service in Atlantic Canada, British Columbia, Quebec and in Ontario.

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[7] Telecom Decision CRTC 79-11 granted CNCP Telecommunications the right to interconnect its intercity facilities to the local telephone network of Bell Canada.

[8] Arrangements for the sharing and resale of carrier facilities to provide enhanced and basic services were approved in Telecom Decision CRTC 87-1 and in Telecom Decision CRTC 87-2.

[9] Telecom Decision CRTC 90-3, *Resale and Sharing of Private Line Services*, March 1, 1990.

[10] Telecom Decision CRTC 92-12, *Competition in the Provision of Public Long Distance Voice Telephone Services and Related Resale and Sharing Issues*, June 12, 1992.

3.0 THE CANADIAN CABLE INDUSTRY

3.1 The Development of Cable Television

The Canadian cable television industry originated in the 1950s, largely in response to consumer demand for distant U.S. television signals. At that time, cable systems were able to offer subscribers a broader range of programming than was available off-air.

The 1960s saw the development of cable television in urban markets. With the passage of the *Broadcasting Act* in 1968, cable television systems were recognized as "broadcasting receiving undertakings", designated to be an integral part of the "Canadian broadcasting system", and federal regulation of the industry increased significantly (see Appendix C). At the time, there were only 300 cable systems in Canada and much of the industry was comprised of single system entrepreneurs providing service to small towns.

CRTC regulation of cable television acknowledged cable's role in delivering a broader choice of broadcasting services to Canadians. In 1971, the CRTC noted:

> . . .cable television can contribute forcefully to the achievement of the fundamental objectives of Canadian broadcasting. It can widen the choice of programs offered to Canadians.[11]

By 1983, the policy focus had changed and the federal government's new broadcasting policy for Canada emphasized the role of cable systems in the delivery of Canadian television programming.

During the 1970s, the number of homes in areas licensed for cable grew from 50% to almost 80% of Canadian homes, and homes passed by cable grew from 40% to over 75% of all homes by the end of the decade.[12] During the same time period, subscribing households grew from 20% to over 50% of all Canadian homes.[13]

Cable systems have since become the main delivery vehicle for broadcast signals to most Canadian homes. Ninety-five percent of households are currently passed by cable and 79% are subscribers to basic cable television[14] (see Figure 5). It is expected that basic subscriber penetration will reach 88% of all homes passed by cable by 1994.[15]

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[11] *Canadian Broadcasting: A Single System — Policy Statement on Cable Television*, July 16, 1971, p. 13.

[12] Moss, Roberts and Associates Inc., *An Economic Profile of the Cable Industry* (Ottawa, 1986), p. 9.

[13] *Ibid*., p. 9.

[14] Department of Communications estimates based on Statistics Canada sources.

[15] Canadian Cable Television Association, *Project 94*, (Ottawa, 1989), p. 9.

In 1990, there were 1,739 cable systems operating in Canada. Ninety-two percent (1,595) of these systems had 6,000 subscribers or fewer; 8% (144) had more than 6,000 subscribers[16] (see Figure 6). The 1,739 systems were controlled or operated by 605 business organizations (790 reporting units) which were either individually owned or incorporated.[17]

3.2 The Role of Cable Television in the Canadian Broadcasting System

In the last two decades, the focus of the CRTC's policy statements on cable television and of the Commission's regulation of the industry has been on the integration of cable television into the Canadian broadcasting system, the expansion of viewer choice in programming and the contribution of the cable industry to Canadian program production. One of the major tools that the Commission has used to implement its policies has been the *Cable Television Regulations, 1986*. These regulations and the CRTC's cable policies are discussed in greater detail in Appendix C.

Pursuant to the regulations, a cable licensee must give priority carriage to local and regional television signals. The regulations also stipulate that cable licensees with over 6,000 subscribers are required to substitute the signal of more distant broadcasters with that of local broadcasters, if the latter request it. The Canadian Cable Television Association estimates that simultaneous program substitution is responsible for $106 million per annum in additional advertising revenues for the Canadian broadcasting system.[18]

Under the regulations, a cable licensee is also required to provide access to a channel for the production and distribution of community programs. In 1988, the cable television industry spent $55 million on community programming. In total, 16,525 hours of programming are distributed on community channels across Canada every month, 40% of which are original programming hours.[19] In addition to community channels and distributing off-air Canadian television signals, the cable industry has, over the last decade, added 18 new Canadian satellite-to-cable television channels to its service offerings.

The passage of the 1991 *Broadcasting Act* confirmed the role of cable television as a key instrument in meeting the objectives of Canadian broadcasting policy as set out in the Act.

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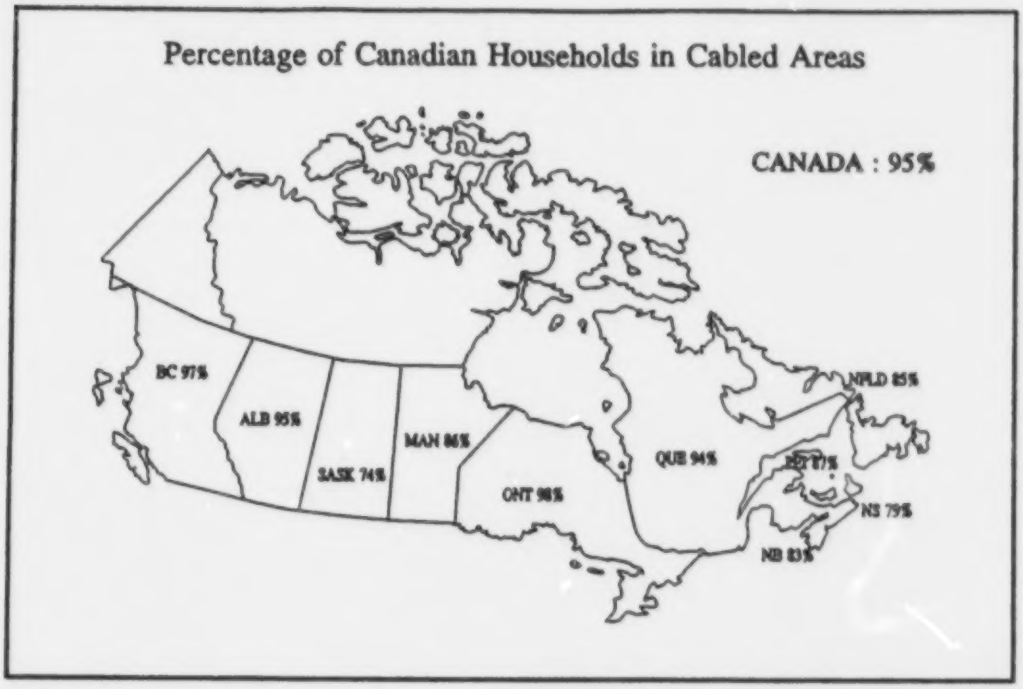
[16] Pursuant to *Cable Television Regulations 1986*, Class 1 licensees are defined as those systems serving 6000 or more subscribers. Class 2 systems are those systems defined as serving less than 6000 subscribers. Part III licensees include systems serving areas where there are two or fewer signals available off-air.

[17] A reporting unit is defined by Statistics Canada as: the smallest unit in the business organization which is capable of reporting the elements of operating statistics such as revenue, expenses, profit and the fixed assets used in the operations. A reporting unit may consist of a single cable television system operating and reporting as a single unit.

[18] Canadian Cable Television Association, *General Information* (Ottawa, 1991), p. 2.

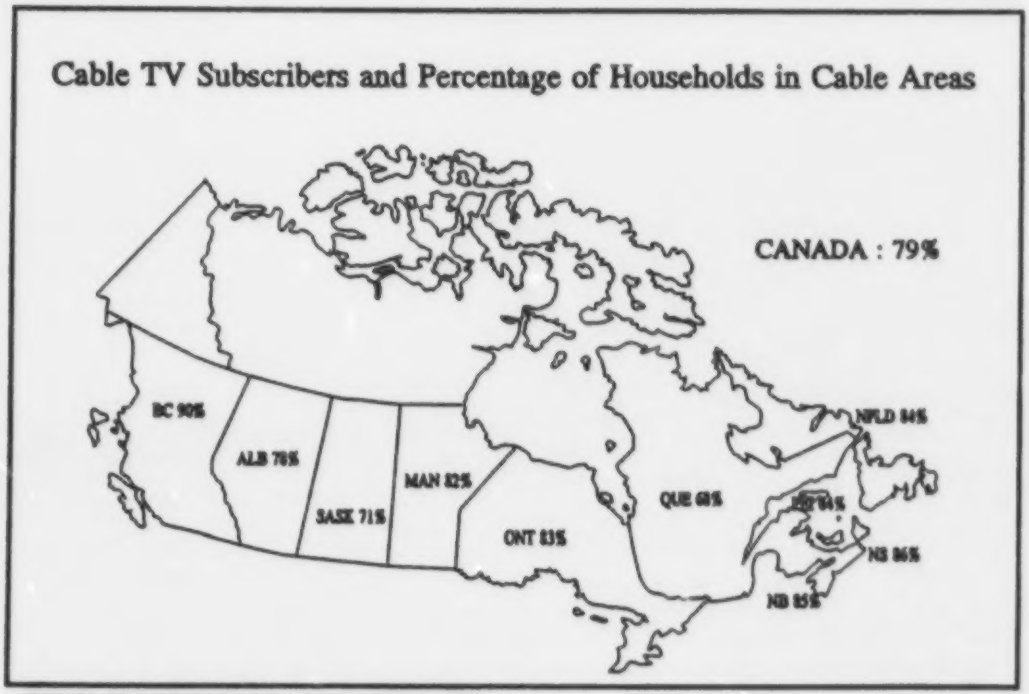
[19] *Ibid.*, p. 2.

Figure 5



Percentage of Canadian Households in Cabled Areas

CANADA : 95%
BC 97%
ALB 95%
SASK 74%
MAN 86%
ONT 98%
QUE 94%
NFLD 85%
PEI 87%
NS 79%
NB 83%



Cable TV Subscribers and Percentage of Households in Cable Areas

CANADA : 79%
BC 90%
ALB 78%
SASK 71%
MAN 82%
ONT 83%
QUE 68%
NFLD 84%
PEI 84%
NS 86%
NB 85%

SOURCE: STATISTICS CANADA ANNUAL SURVEY, 1991.

Figure 6

Top 10 Cable Television Operators

	OPERATING SYSTEMS		SUBSCRIBERS	
Rogers	16	0.9%	1,616,363	22.8%
Vidéotron	45	2.6%	1,044,186	14.7%
Maclean-Hunter	35	2.0%	644,341	9.0%
Shaw Cablesystems	23	1.3%	456,586	6.4%
COGECO	48	2.8%	392,050	5.5%
Cablecasting	12	0.7%	322,310	4.5%
Trillium Cable	24	1.4%	316,324	4.4%
CF Cable	1	0.1%	201,523	2.8%
Winnipeg Videon	2	0.1%	145,960	2.0%
P.J.Thomson Trust	2	0.1%	120,166	1.7%
Rest of the Cable Operators	1,531	88.0%	1,864,415	26.2%
Total	1,739	100.0%	7,124,224	100.0%

Source: Statistics Canada Annual Survey, 1990.
DOC/CRTC Broadcasting Ownership Database.

SYSTEM SIZE	OPERATING SYSTEMS		SUBSCRIBERS	
Subs. <= 1,000	1,330	76.5%	330,230	4.6%
1,000 < Subs. <= 6,000	265	15.2%	671,501	9.5%
> 6,000 Subs.	144	8.3%	6,122,493	85.9%
Total	1,739	100.0%	7,124,224	100.0%

Source: Statistics Canada Annual Survey, 1990.

3.3 Industry Consolidation

The Commission's early regulation of the cable industry favoured local ownership. In its licensing of cable systems, the CRTC also encouraged a diversity of ownership. The latter CRTC policy is illustrated by the following comments made by the first Chairman of the CRTC, Pierre Juneau:

> . . . we are in favour of as many participants in the industry as possible at this stage . . . whenever we think that an independent company can be preserved, we'll do it . . . If consolidations are going to take place . . . we would want the small independent groups . . . to put up a good fight.[20]

The Commission's local ownership policy is evident in some of its early decisions. In one, the CRTC referred to the importance of community participation in the ownership of a broadcasting undertaking, indicating that it was appropriate to consider the following criteria:

- the balance between shareholders from the community and shareholders from outside the community to be served by the station;
- the balance on the Board of Directors of the company between members of the community to be served by the station and other members of the Board; [and]
- the capacity of the company as demonstrated by the structure of ownership and by the composition of the Board of Directors to understand the characteristics of the community to be served and to meet the various needs of that community.[21]

Over time, ownership of the cable industry has been consolidated to some extent. In this context, the 1986 Report of the Task Force on Broadcasting Policy noted that:

> concentration of cable ownership, under regulation, may well be desirable in many parts of the country to foster the capital development that is needed to provide additional services and better quality through the installation of new technology.[22]

Currently, ten cable companies provide basic cable television service to 74% of all Canadian subscribers (see Figure 6). Rationalization of the cable industry has, to some extent, been slowed by the CRTC's policy of extracting "tangible" benefits for the Canadian broadcasting system from any acquirer of a cable company or other broadcasting licensee. In considering an acquisition of a cable company, the CRTC requires applicants to demonstrate that significant and unequivocal benefits will accrue to the communities served by the undertaking and to the Canadian broadcasting system as a whole. Such benefits have generally involved additional operating expenditures (in the areas of additional staff or programming improvements), capital expenditures for technical improvements and grants or contributions to Canadian talent or program development funds.

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[20] See note 12, at p. 8.

[21] CRTC Decision 68-39, August 27, 1968, p. 1.

[22] *Report of the Task Force on Broadcasting Policy* (Ottawa: Minister of Supply and Services, 1986), p. 629.

The CRTC has applied this benefits policy in a number of decisions on ownership in the last decade, commencing with its denial of the Maclean-Hunter Cable T.V. Limited application to acquire Western Cablevision Limited in 1977.[23]

On June 15, 1992, the CRTC called for comments from interested parties on possible modifications to the benefits test.

4.0 A COMPARATIVE EXAMINATION OF THE TELEPHONE AND CABLE INDUSTRIES

The Local Networks Convergence Committee examined a wide range of issues relating to the potential for convergence of telephone and cable markets and services. By way of background to a consideration of these issues, this section provides a comparative overview of some of the key economic and financial features of each industry. Figure 7 provides a visual perspective of the relative size of each industry in terms of 1990 operating revenues.

4.1 Significance of Monopoly Services

Both industries derive a significant proportion of their revenues from the provision of monopoly services. However, the monopoly power of both industries is being eroded, and, in particular, it is frequently argued that basic cable services are provided in a considerably more competitive environment than local telephone services. In the case of the telephone industry, 40% of total 1990 revenues came from monopoly basic telephone service and 43% from public long distance service (see Figure 8). The latter will soon become subject to competition under the CRTC's June 12, 1992 decision. For the cable industry, 83% of total revenues were earned from basic cable services and 17.3% from pay and specialty services.

4.2 Financial Profiles of Both Industries

Figures 9 and 10 provide financial profiles of the telephone and cable television industries from 1986 to 1990.

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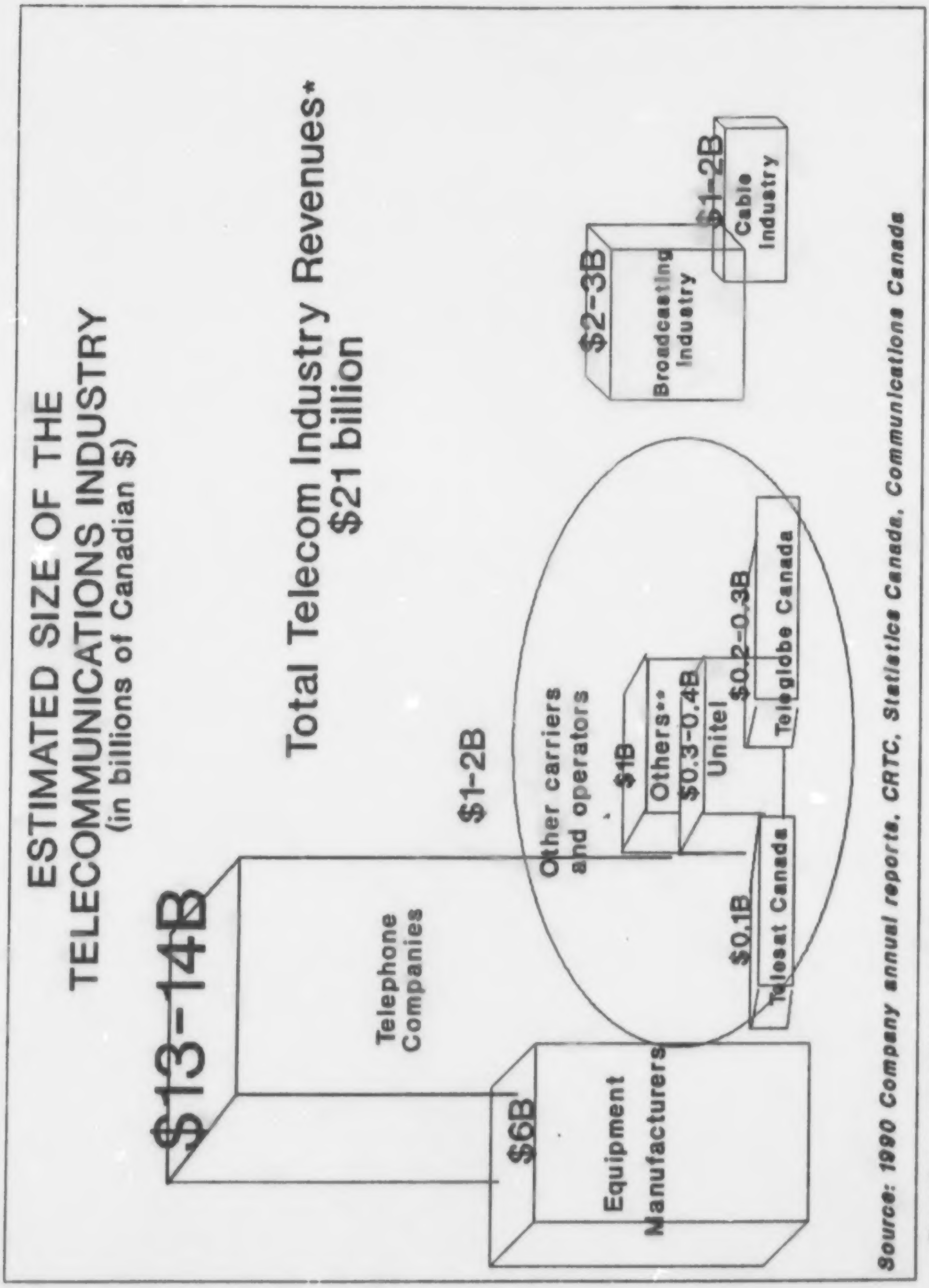
[23] Other key decisions have included the 1979 approval of the acquisition by Rogers Telecommunications Limited of Canadian Cablesystems Limited, the approval of the acquisition in 1985 of Maisonneuve Broadcasting Limited by CHUM Limited and the denial of Power Corporation's purchase of Télé-Metropole in 1986.

Figure 7



Source: ***1990 Company annual reports, CRTC, Statistics Canada, Communications Canada***

* Based on operating revenues

** Radio Common Carriers, cellular companies and resellers, etc.

Figure 8

Industry Revenue Breakdown for Telephone and Cable TV Industries

BREAKDOWN BY INDUSTRY	1990 ESTIMATED REVENUES(1) (in millions of dollars)	% OF TOTAL INDUSTRY
TELEPHONE INDUSTRY:		
1.0 Long-distance market		
1.1 Monopoly	5856	42.7%
Competitive		
1.2 network services	773	5.6%
1.3 terminals	494	3.6%
total long distance	7123	
2.0 Other (2)	576	4.2%
3.0 Local market		
3.1 Monopoly(3)	4347	31.7%
Competitive		
3.2 network services	516	3.8%
3.3 terminals	1152	8.4%
total local	6015	
total industry	13714	100.0%
CABLE - TV INDUSTRY:		
4.0 Monopoly		
4.1 basic cable service	1357	82.7%
4.2 pay and specialty services	284	17.3%
total industry	1641	100.0%

Notes: (1) The breakdown of telephone industry revenues is based on Phase III, Cost Inquiry 1990 actual results. The ratios used to allocate the total industry revenue were derived from Bell Canada's figures. The terminal revenues were allocated between local and long distance based on a 60/40 ratio.

(2) Other revenues are those not related to the provision of telecommunications services. Examples are revenues from the rental of building space to others and communications seminars.

(3) Monopoly local revenues are those derived from: the provision of basic telephone service; network access services; monthly subscriptions fees; installation; maintenance; and other related services.

Source: Company annual reports, CRTC, Statistics Canada, Communications Canada; for the year ending December 31, 1990.

Figure 9

Financial Profiles of the
Telephone and Cable Television Industries(1)

	1990		1989		1988		1987		1986	
	Telcos	Cable TV	Telcos	Cable TV	Telcos	Cable TV	Telcos	Cable TV	Telcos	Cable TV
Assets and Liabilities and Net Worth:										
-Assets	29509	3270	28030	2591	26027	2253	24356	1981	23199	1407
-Liabilities	16744	2611	17053	1996	16048	1861	14551	1551	14151	1083
-Long term debt	10296	813	10667	476	9814	477	9101	415	9047	369
-Shareholders' equity (net worth)	12765	659	10978	595	9979	392	9805	429	9047	324
Operating Revenues and Expenses:										
-Revenues	13302	1641	12644	1451	11880	1260	11093	1100	10601	969
-Expenses	9961	1400	9489	1166	8893	1019	7657	920	7093	806
-Net Income	3341	242	3155	285	2987	240	3435	181	3508	163
Profit before Interest and Taxes:	3595	378	3388	403	3225	343	3131	282	3128	248
Profit after Taxes (Net Profit):	1519	181	1450	218	1299	173	1157	116	1081	100
Ratios:										
-Return on Investment(2)	13.7%	14.5%	13.7%	20.7%	14.0%	18.8%	14.4%	17.8%	15.1%	23.0%
-Return on Equity (3)	11.9%	27.5%	13.2%	36.6%	13.0%	44.1%	11.8%	27.0%	11.9%	30.8%
-Debt Ratio(4)	44.6%	55.2%	49.3%	44.4%	49.6%	54.9%	48.1%	49.1%	50.0%	53.3%
-Return on Net Fixed Assets(5)	n/a	19.4%	n/a	26.0%	n/a	28.1%	n/a	27.9%	n/a	28.8%

Notes:
(1) Cable TV includes pay and discretionary services.
(2) (Profit before interest and taxes)/(Total liability and equity - Total current liability)
(3) (Net Profit)/(Shareholders' equity or net worth)
(4) (Total long-term debt)/(Total long-term debt + Shareholders equity or net worth)
(5) Based on CRTC methodology, specific for Cable TV industry

Source: Statistics Canada's Annual Survey on Cable Television (56-205)
and Statistics Canada's Annual Survey on Telephone Companies (56-203).

The telephone industry generated seven times the operating revenues of the cable industry in 1990. In addition, the telephone industry's $30 billion in assets were almost ten times larger than the assets of the cable industry in 1990.

The telephone industry has experienced substantial growth over the last decade. During the period 1986 to 1990, the industry's total operating revenues increased by some 25% from $10.6 billion to $13.3 billion. The industry's total operating expenses for the same period increased from $7 billion to $10 billion. Net profit after tax amounted to $1 billion in 1986 and increased by some 50% to $1.5 billion by 1990.

Revenue, expense and profit trends are somewhat different for the cable industry. Between 1986 and 1990, cable television revenues increased by 69% from $969 million to over $1.6 billion. In 1990, cable operating expenses were $1.4 billion, representing an increase of 74% since 1986. Thus, the cable industry's operating expenses increased more than operating revenues. Industry profits before taxes and interest grew steadily from 1981 to 1989. However, in 1990, cable operators reported a 17% decrease in profits after taxes, from $218 million to $181 million.

Total assets of the telephone industry increased by $1-$2 billion per annum between 1986 and 1990. Shareholders' equity increased from $9 billion in 1986 to nearly $13 billion in 1990. The proportion of the telephone industry's assets financed by debt was 44% in 1990, a ratio that has steadily decreased since 1981 (see Figure 11). The debt ratio in 1981 was 55%. Although the industry return on equity increased from around 12% in 1986-87 to around 13% in 1988-89, it fell back to around 12% in 1990.

From 1981 to 1990, the cable industry's return on net fixed assets averaged 24%.[24] Return on net fixed assets has been decreasing since 1988. Returns fell from 28.1% in 1988 to 19.4% in 1990. The Commission's current benchmark for a reasonable level of rate of return (before interest and taxes) on net fixed assets is 23%.[25]

Debt ratios have generally been higher in the cable industry than the telephone industry (see Figure 11). However, the cable industry's debt ratio dropped to a low of 44% in 1989. It subsequently increased to 55% in 1990. Major system upgrades and consolidation within the industry were among the factors leading to the increased debt levels.

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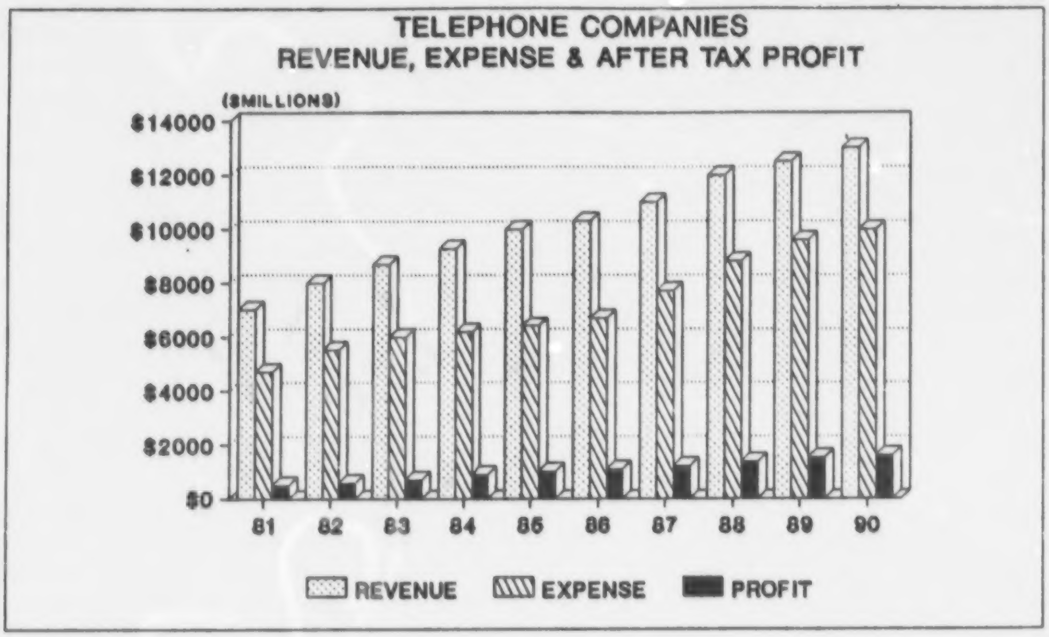
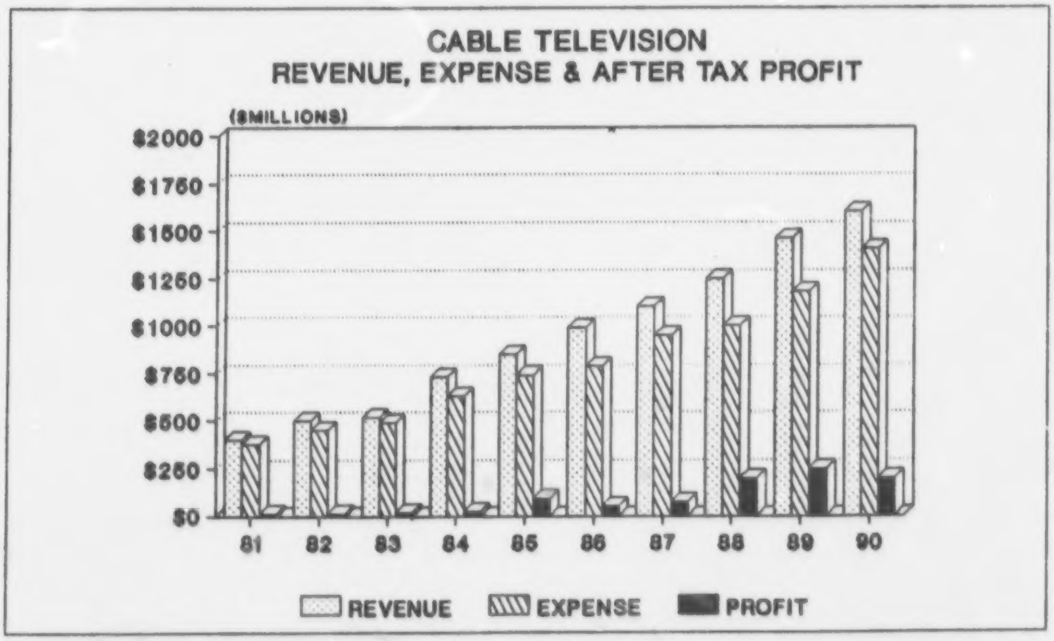
[24] Return on Net Fixed Assets (RNFA) is the measure favoured by the CRTC to measure profitability in the cable industry.

[25] Average is based on the last five years, the current and projected year.

Figure 10





SOURCE: STATISTICS CANADA ANNUAL SURVEY, 1990.

5.0 ALTERNATIVE LOCAL DISTRIBUTION SYSTEMS

5.1 Alternatives to the Local Residential Telephone Distribution Network

5.1.1 Cellular Radio Telephone Systems

Cellular telephone service was officially inaugurated in Canada on July 1, 1985. As previously indicated, cellular service is provided on a duopoly basis by Rogers Cantel and the members of Cellnet Canada. Rogers Cantel is a subsidiary of Rogers Communications Inc. and is licensed to operate in all areas across Canada. Cellnet Canada, formed in 1986, is an association of telephone company affiliates. The Cellnet members are divisions or affiliates of the telephone companies operating in the various regions of Canada (see Figure 12). Cellular service is now available to approximately 80% of the population and more than 700,000 subscribers are being served by these two providers.[26]

The growth of cellular telephone service in Canada has exceeded even the most optimistic forecasts made at the time of its introduction. Many observers have attributed this growth to the fact that aggressive competition exists between Rogers Cantel and CellNet. Digitization of cellular service, which is currently under way, will permit increased cellular traffic handling capacity and improved transmission quality and confidentiality.

5.1.2 Personal Communication Networks (PCN)

The desire for flexibility in communications has resulted in increased demand for radio-based mobile and portable products and services such as cellular mobile, radio paging services and personal cordless telephone systems. The development of these products and services has given impetus to Personal Communication Networks (PCNs), a service concept that can provide person-to-person communications rather than point-to-point communications. PCN developers promise the following service benefits:

- direct seamless connectivity of people to other people, services and information through personal numbering systems and intelligent network architectures;
- the development of a high degree of service mobility and portability through complementary developments and interconnection of both fixed and mobile networks and the development of easy-to-use, portable multi-media terminals;
- the integration of different forms of information (data, text, image and voice); and

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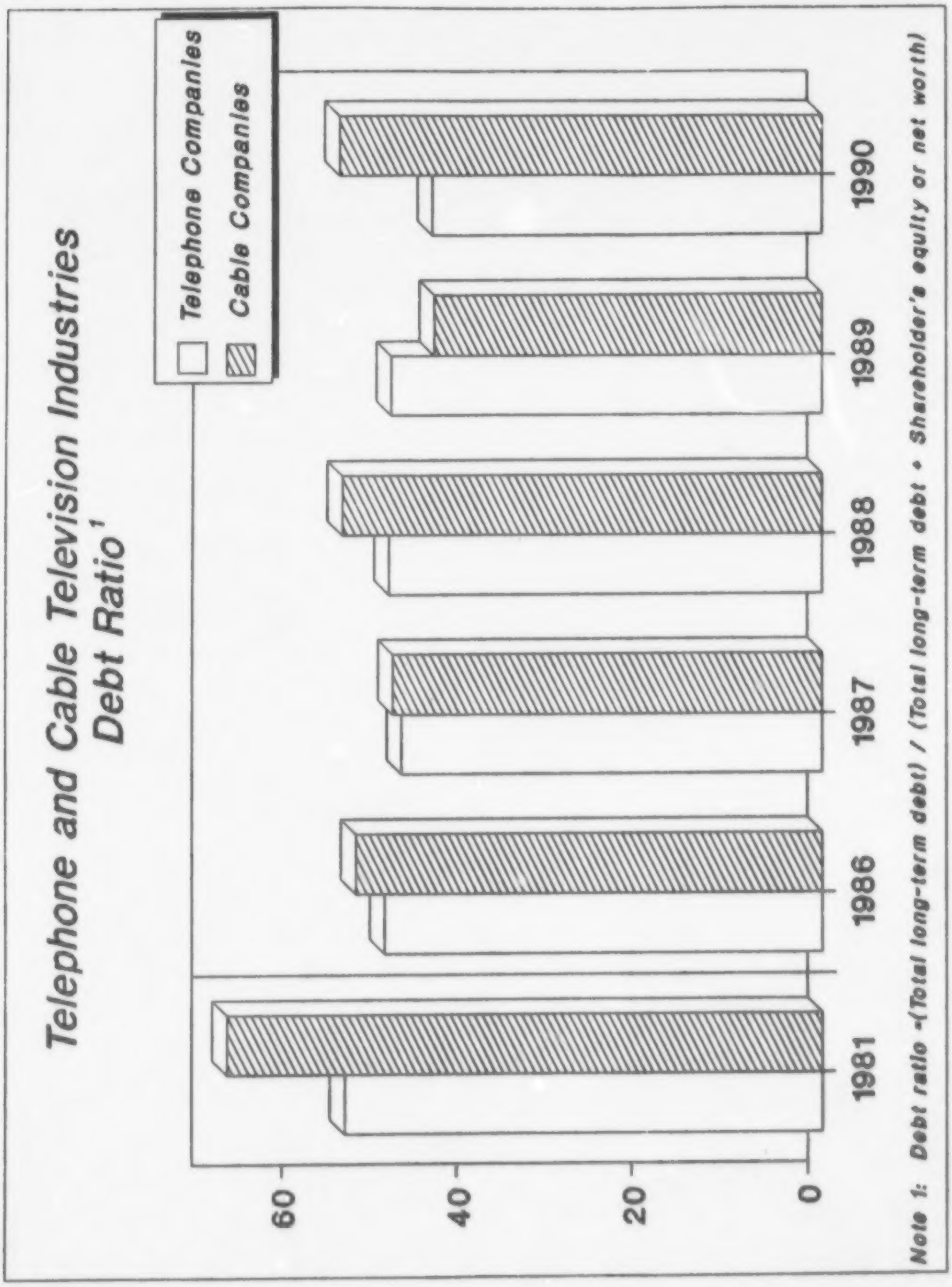
[26] Northern Business Information, *Canadian Mobile Communications Report* (1990), p. 24.

Figure 11



Note 1: *Debt ratio =(Total long-term debt) / (Total long-term debt + Shareholder's equity or net worth)*

Source: Department of Communications

Figure 12

Cellnet Canada Members

COMPANY	PROVINCE
B.C. Cellular Limited	British Columbia
ED TEL Cellular	Alberta
AGT Cellular Limited	Alberta
SaskTel Cellular	Saskatchewan
MTS Cellular	Manitoba
Thunder Bay Cellular	Ontario
Kenora Cellular	Ontario
Bell Cellular	Ontario and Quebec
Québec-Téléphone Cellulaire	Quebec
NBTel Cellular	New Brunswick
NewTel Cellular	Newfoundland
MT&T Cellular	Nova Scotia
Island Tel Cellular	Prince Edward Island

- personalization of network and service provisioning through the application of computer intelligence and the development of natural system interfaces (personal agents).[27]

Some industry experts predict that personal mobility will continue to be an increasingly important factor affecting the development of future networks. In this regard, it is expected that wireless networks will become an increasingly significant competitor to local telephone wireline networks.

5.1.3 Public Cordless Telephone Systems

Advances in wireless technology have led to development of public cordless telephone systems (PCTS). PCTS utilizes digital cordless telephones interconnecting with the telephone network at public access points. In the operation of this service, pocket-sized lightweight telephones are utilized within a limited radius (two hundred metres) of public access points.

In 1990, the Department of Communications licensed 22 companies to conduct field trials on PCTS. The trials were initiated for the purpose of:

> . . . determining spectrum requirements, developing a consensus on technical standards, identifying appropriate licensing requirements and determining the future demand and market possibilities for public cordless telephone service in Canada.[28]

In 1991, the Department of Communications called for expressions of interest from companies wishing to offer public cordless telephone systems and received 85 responses to this call. The recommendations of an Industry Advisory Committee that the so-called "CT2 Plus" standard be utilized in Canada has now been adopted by the Department.

It is expected that by the fall of 1992, public cordless telephone systems will be licensed. The Department is expected to issue two national licenses and to license two other operators in each region. The extent to which PCTS will become competitive with local telephone wireline networks is uncertain. Some observers think that PCTS will be a supplementary, rather than an alternative, telephone service. However, others believe that PCTS could in the future become a significant competitor to the local wireline telephone networks.

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[27] *Vision 2000, The Future of Personal Communications in Canada (presentation to the 1990 NBI Canada Executive Briefing*, 1990), p. 27.

[28] Department of Communications, "Provision for Field Trials of Public Cordless Telephone Service in Canada and Public Consultation for Policy Direction", *Canada Gazette* Part 1, Notice No. DGTP-014-89.

5.1.4 Paging Systems

Unlike cellular telephone service, which is provided on a duopoly basis, paging services are provided by hundreds of radio common carriers, ranging from very small local businesses to large national operators. In 1989, the total paging market was worth $193 million.[29] Most observers are of the view that paging systems are complimentary to local telephone wireline networks and to cellular telephones. Like cellular telephones, pagers are used predominately by the business sector. Some observers have expressed the view that the paging industry will face increasing competitive pressure in the future owing to technological convergence or obsolescence.[30]

5.1.5 MSAT (Mobile Satellites)

Industry observers have identified mobile satellite communications as a major area of growth over the next two decades. Telesat Mobile Inc. (a subsidiary of Telesat Canada) is planning to launch a mobile satellite in 1994 to provide mobile voice and data communications services for ground use and for vehicles, ships and aircraft.

Mobile satellite systems and services could capture a significant portion of the emerging market for personal and mobile communications. Proposed mobile satellite services may be regarded as an extension of the terrestrial mobile personal network.

Additional mobile communications services could be provided by Low Earth Orbit (LEO) satellite systems currently being proposed by a number of applicants to various international and national regulatory agencies.

5.1.6 Local Area Networks (LANs) and Metropolitan Area Networks (MANs)

While most local telephone services are provided by telecommunications carriers, in some instances users build their own local and/or long distance private line networks utilizing, for example, microwave or fibre optic facilities. Those networks typically utilize leased, as opposed to public, common carrier transmission facilities, in addition to some customer-owned facilities. In the last few years, there has been a rapid growth of Local Area Networks (LANs). In Canada, LANs are used for intra-campus data communications and for corporate building applications. Major corporate users are now requesting interconnection of LANs to provide metropolitan area networks (MANs). MANs connect multiple sites and provide alternatives to traditional telephone company service offerings and, in effect, bypass the public local access telephone network.

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[29] See note 26, p. 39.

[30] *Ibid.*, p. 38.

5.2 Alternatives to the Cable Television Distribution Network

5.2.1 Over-the-air Broadcasting

Twenty five percent of Canadian television households receive television service by means of over-the-air delivery.[31] Canada's television industry has been characterized since its inception in 1952 by private and public elements. The public sector is comprised mainly of the Canadian Broadcasting Corporation (CBC) and provincial educational broadcasters. The CBC relies for most of its revenues on Parliamentary appropriations with the balance coming from advertising revenues. Provincially-owned broadcasting authorities in Alberta, British Columbia, Ontario and Quebec have a mandate to produce and distribute over-the-air, primarily educational programming aimed at their respective provincial audiences.

The private sector consists of television networks such as the CTV network, and the TVA network. In addition, there are privately-owned stations affiliated with the CBC and various independent stations, primarily in large metropolitan areas.

In the last few years, Canadian television networks, both public and private, have faced increased competition and fragmentation of audiences. This fragmentation has reduced audience shares of individual stations, and the advertising revenues of the television industry as a whole. For example, the audience share of CTV declined from 29% in 1985 to 23% in 1989.[32] In French language television, the impact of competition and fragmentation on advertising revenues has been even more pronounced. For example, the TVA audience share declined 10 points from 52% to 42% between 1985 and 1989.[33]

Fragmentation of audiences in the television industry can be attributed to the entry of new players in the market. The introduction of pay-television and specialty services, the carriage of U.S. specialty services on cable, and the licensing of independent television stations have contributed to this fragmentation.

Technical, consumer and competitive factors are changing the world of television as we know it. Some are of the view that broadcasting will evolve from more passive "viewing" to more active "using" and from "programming" to "accessing." The recently licensed pay-per-view services are indicative of a trend away from advertiser supported programming to subscription-based viewing. Some in the industry predict that the arrival of U.S.-based DBS services in Canada in 1994 will also significantly impact on Canadian television broadcasters. To maintain a competitive advantage, most cable operators consider that they will have to provide subscribers with a greater selection of services and more options in the way subscribers pay for such services.

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[31] Canadian Association of Broadcasters, *Television Strategic Plan*, p. 22.

[32] *The Economic Status of Canadian Television* (Ottawa: Minister of Supply and Services, 1991), p. 55.

[33] According to the report *Economic Status of Canadian: Television*, one share point translates into about $20 million of annual advertising revenues.

Today, more radio signals are received over-the-air than via cable. Almost all Canadians (98.1%) own at least one radio set. Radio is the most widely available source of essential news and information and a primary source of music and entertainment for many Canadians. Radio is provided by the public (CBC) and private sectors. The private sector relies on advertiser revenue. Radio's share of total advertising dollars in 1990 was 7.7%, compared to 16.5% for television.[34]

Digital-audio-broadcasting (DAB) poses a potential alternative (or supplement) to the existing means of receiving radio programming into the home. In addition, music programming services provided via cable on a subscriber pay basis, are likely to provide a competitive alternative or supplement to advertiser-supported radio services.

Personal mobility will also have a significant impact on over-the-air radio. The development of CD players, portable stereos and walkmans have created alternatives to the over-the-air broadcasting system. Sixty percent of Canadians now have a cassette player in their car; CD players are now in more than 15% of homes and are making their way to the car.[35] Fifty percent of Canadians own a portable walkman-style player and over 60% own a portable stereo.[36]

5.2.2 Home Video

Approximately 60% of all television households in Canada have home video equipment with which they are able to watch pre-recorded television programming or video cassettes from their local video rental store.[37] In the last ten years, the home video market has emerged as a significant competitor to pay television services. Unlike the cable industry, the home video industry is not a federal responsibility and does not fall within the jurisdiction of the CRTC. Thus, the home video industry is not required to support the objectives of the Canadian broadcasting system as outlined in the *Broadcasting Act*, nor any similar content-related objectives established under provincial legislation.

In 1988, it was estimated that Canadian consumer spending on pre-recorded video cassettes (both rental and purchase) was $1 billion.[38] In the same year, Canadian households with VCRs rented a total of 260 million videotapes. It is being projected that the home video market will continue to exhibit growth in revenues and usage as consumer demand for home entertainment services increases.

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[34] Canadian Association of Broadcasters, *Taking the Lead II: A Strategic Plan for the Private Radio Industry*, p. 10.

[35] *Ibid.*, p. 9.

[36] *Ibid.*, p. 9.

[37] NGL Consulting Ltd., *Home Video in Canada* (Ottawa, 1989), p. 10.

[38] *Ibid.*, p. 17.

5.2.3 Direct Broadcast Satellites

In May 1983, the Department of Communications announced a policy formally authorizing the ownership and use of satellite dishes by private individuals. The policy stated that no licence was required by owners of satellite dishes provided that the signals received were not distributed to others. It is estimated that there are approximately 250,000 direct-to-home (DTH) dishes in Canada.[39] These dishes are primarily located in rural areas where cable services are not available. Subscription levels to Canadian DTH satellite services are low, primarily because a large number of households receive U.S. services through illegal descramblers.

The planned introduction of U.S.-based DBS services in Canada is being viewed as a significant competitive threat by the cable industry. Hughes Communications and Hubbard Broadcasting have announced that they plan to commence broadcasting in 1994. These services will utilize advanced digital compression technologies and their satellite will provide more than 100 broadcast channels. The programming that will be delivered via U.S. DBS services is likely to include multi-channel pay-per-view services and specialty television services. Some are of the view that the U.S.-based DBS services will initially have potential appeal in those Canadian television households that are not within cable's reach. While most industry experts are of the opinion that the entry of these services into Canada will have an impact on the cable industry, it is not certain what the extent of this impact will be.

5.2.4 Multipoint Distribution Systems

Referred to as "wireless cable", Multipoint Distribution Systems (MDS) use part of the microwave spectrum, from 2500-2686 MHz, to broadcast up to 31 television channels. Under the Department of Communication's radio spectrum licensing policy, 15 of these 31 channels are reserved for broadcasting. The remaining 16 channels are assigned to multipoint communication systems which include services for the distribution of video messages, video teleconferencing and instructional television.

In 1987, the CRTC first indicated its intent to consider the licensing of MDS. The Commission was interested in providing access to a greater choice of television programming in areas where the further expansion of coaxial cable services was not financially feasible.[40] The CRTC's Notice proposed three areas in which MDS technology could be employed:

- to extend service within a cable system's authorized service area where cable extension would be uneconomical;

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[39] *Ibid.*, p. 17.

[40] Public Notice CRTC 1987-254, November 26, 1987.

- to introduce new cable services in unserved areas; and,
- to provide a competitive delivery system for discretionary services.

In 1989 and 1990, the Commission considered applications for the establishment of MDS services, however, it ultimately denied all of the applications. At the 1990 hearing, the regulatory issues that were addressed included the role that MDS could play in the broadcasting system and the question of whether MDS would be viable in the long run.

On June 12, 1992, at the conclusion of new hearings held in 1991 which reviewed several applications for licences to serve less densely populated areas that cannot be economically served by cable, the CRTC announced that no licences would be issued to provide MDS at that time. In its decision, however, the Commission noted that recent advances in broadcasting technology such as digital video compression and direct broadcast satellite transmission have made it imperative for the Commission to consider further the licensing of applications proposing the use of MDS technology. The Commission is expected to consult the industry, the provinces, consumer groups and the public to determine how best to introduce MDS. The Commission is also expected to address the recent advances in broadcasting technology in the context of a policy hearing on the cable industry tentatively scheduled for the spring of 1993.

APPENDIX B

A TECHNICAL OVERVIEW OF THE LOCAL DISTRIBUTION NETWORK INFRASTRUCTURE

APPENDIX B

A TECHNICAL OVERVIEW OF THE LOCAL DISTRIBUTION NETWORK INFRASTRUCTURE

This Appendix provides an overview of local telephone and cable television networks. The current status of local network evolution is reviewed and service technology and network architecture trends for the medium term timeframe (up to five years) are discussed. The objective is to evaluate the potential for economies of scope, i.e. do they exist and if so, where are they found in the network? The underlying cost structure of different local network configurations is estimated and provides the foundation for the discussion on economies of scope.

1.0 EXISTING LOCAL NETWORK ARCHITECTURES

1.1 Existing Telephone Company Local Network Architectures

Local telephone networks provide for two way transmission. The majority of the installed local network plant is based on copper twisted pairs which limits the signal bandwidth to 1.5 Mbit/s. Current fibre optic technology can provide up to 2.4 Gbit/s which is equivalent to more than 30,000 voice lines or 48 digital NTSC channels of broadcast quality. Local central office (CO) switches can serve up to approximately 100,000 subscribers maximum.

The telephone company local or access network is defined as the portion from the local CO to the subscriber, be it a residential or business subscriber, as shown on Figure 1.[1] Different configurations exist in the local network depending on the environment (e.g. urban versus rural) and the type of subscriber (residential versus business). Each type of configuration is explored below with particular emphasis on the technologies used and the resultant cost structures. All details of the cost structure information are provided in Annex A.

1.1.1 Downtown Business Office Network Configuration

Figure 2[2] presents a typical local network configuration for a downtown office building, i.e. a multi-tenant high-rise office building as is often encountered. This application consists of a feeder link from the CO to the customer and a distribution or loop network within the building. The typical feeder link does not exceed 3 kilometres in length. The transmission equipment is located at both ends of the feeder link. The customer end-equipment is located in an enclosed

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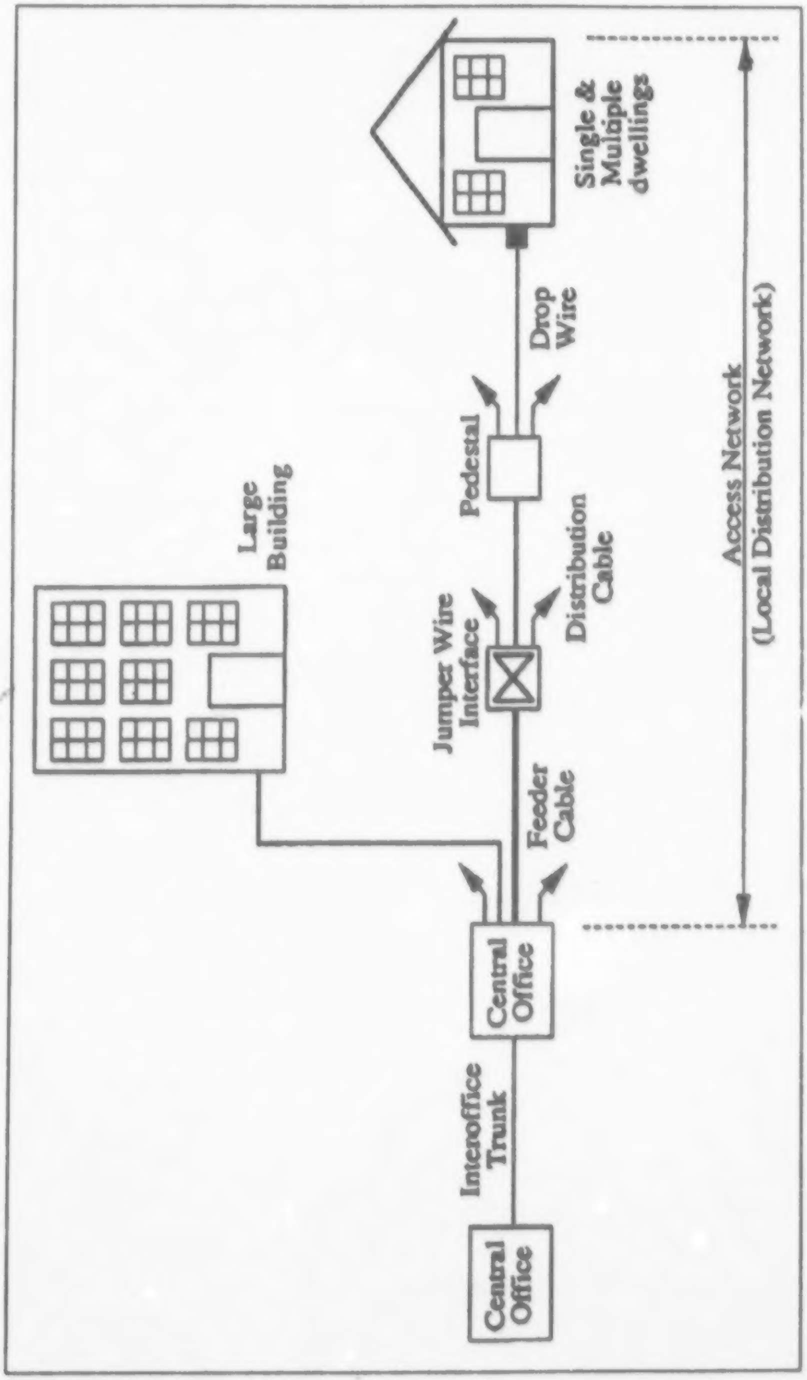
[1] *Bell Canada Current and Long Term Plans for Fiber Provisioning*, presented by P.M. Hubert, Assistant Vice-President, Technology Research, July 16, 1991 (CRTC Hearing).

[2] DTI Télécom.

Figure 1
Telephone Company Local Network


Central Office
Interoffice Trunk
Central Office
Feeder Cable
Jumper Wire Interface
Distribution Cable
Pedestal
Drop Wire
Large Building
Single & Multiple dwellings
Access Network (Local Distribution Network)

and access-restricted area in the office building, usually on one of the lower floors. All feeder cables are installed in underground conduits.

The telephone company usually owns the terminating customer-located equipment. This equipment often consists of a Digital Loop Carrier (DLC), equipped with either a fibre-based or copper-based transmission system. It provides the feeder termination, demultiplexes down to the DS-1 (1.5 Mbit/s) or the DS-0 (56 Kbit/s) level, provides the line interfaces going to the riser cable as well as all the operations, administration, maintenance and provisioning functions, either locally controlled or in concert with the CO end of the system. The DLCs are used in the provision of both voice and narrowband data services. Interfaces for high speed data up to 45 Mbit/s can be provided via the fibre multiplexers. The line interfaces couple to the riser cable. Currently, the vast majority of riser cables are still copper. Although the detailed configurations can vary, there are usually equipment rooms on every floor where private branch exchanges (PBXs) and T1 (1.5 Mbit/s) statistical multiplexers are found.

For the purpose of this document, the investigation of the cost structure extends to the end of the riser cable and excludes customer-owned equipment and terminals. The cost structure for this configuration is as follows:

- A total estimated cost of $900 per line for 500 lines served at a distance of 1.5 km from the CO to the building served.
- Initial capital investment breakdown:
    - outside plant cable: 22%
    - transmission link including customer located DLC and multiplexing equipment: 67%
    - riser cable: 11%

1.1.2 Business Industrial Park Network Configuration

Figure 3[3] depicts the typical network configuration for business subscribers located in industrial parks. The major differences between that and a downtown application are due to the distances involved (>5 kilometres feeder link) and the locations typically on the outskirts of the town and cities. Cable installation is usually aerial or buried in a trench. The DLC equipment is usually located in a telephone company cabinet or hut in the industrial park. Distribution loops then extend to the various buildings with a maximum distance of approximately 3 kilometres.

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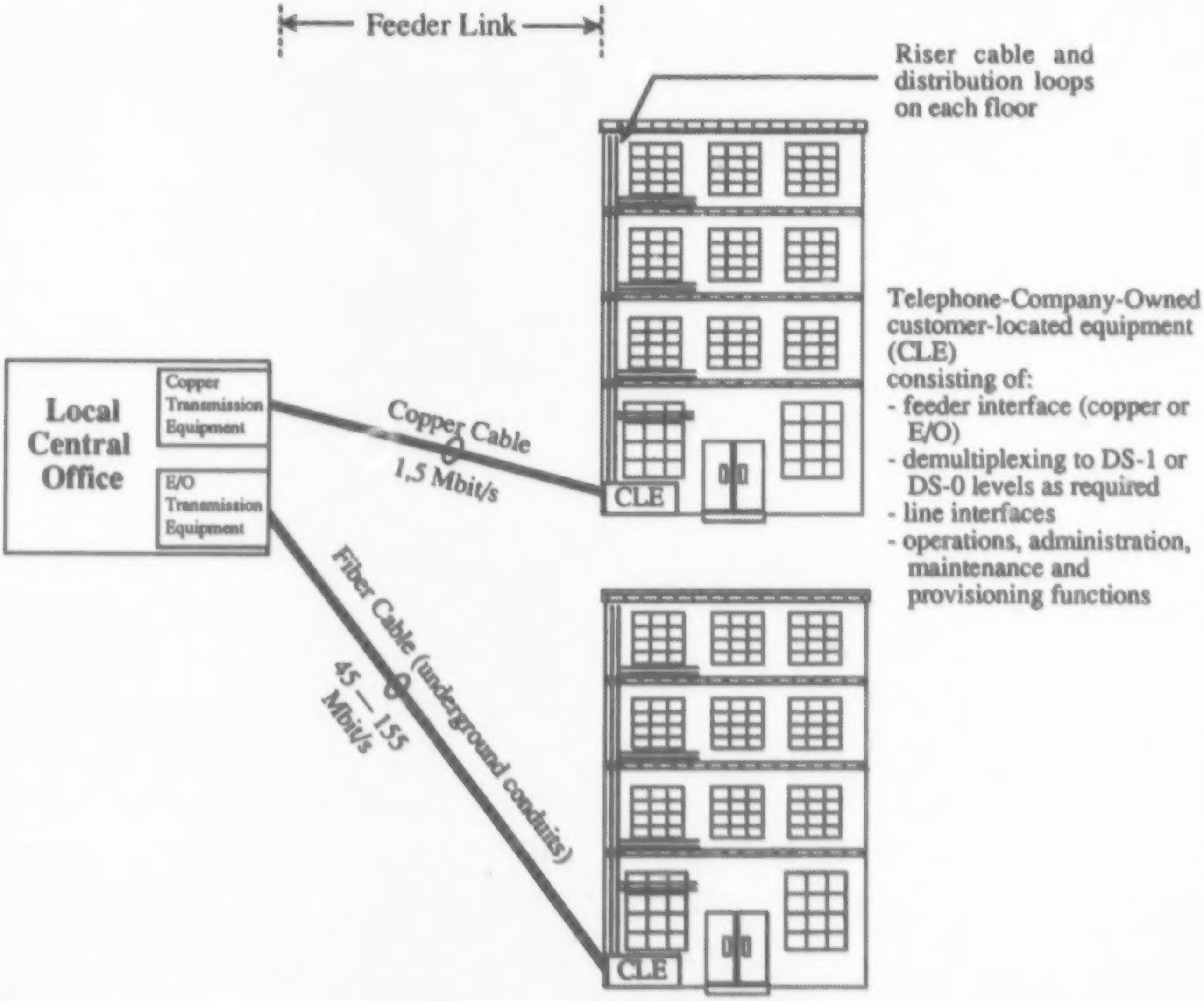
[3] DTI Télécom.

Figure 2
Telephone Company Local Network for a Downtown Business Application


Feeder Link
Riser cable and distribution loops on each floor
Local Central Office
Copper Transmission Equipment
E/O Transmission Equipment
Copper Cable
1,5 Mbit/s
Fiber Cable (underground conduits)
45 — 155 Mbit/s
CLE
CLE
Telephone-Company-Owned customer-located equipment (CLE)
consisting of:
- feeder interface (copper or E/O)
- demultiplexing to DS-1 or DS-0 levels as required
- line interfaces
- operations, administration, maintenance and provisioning functions

The cost structure of this configuration is:

- A total estimated cost of $1850 per line on the basis of 500 lines served with a 10-kilometre feeder to the remote.
- Initial capital investment breakdown:
    - outside plant cable: 46%
    - transmission link including multiplexing equipment and outside plant housing: 32%
    - distribution loops: 22%

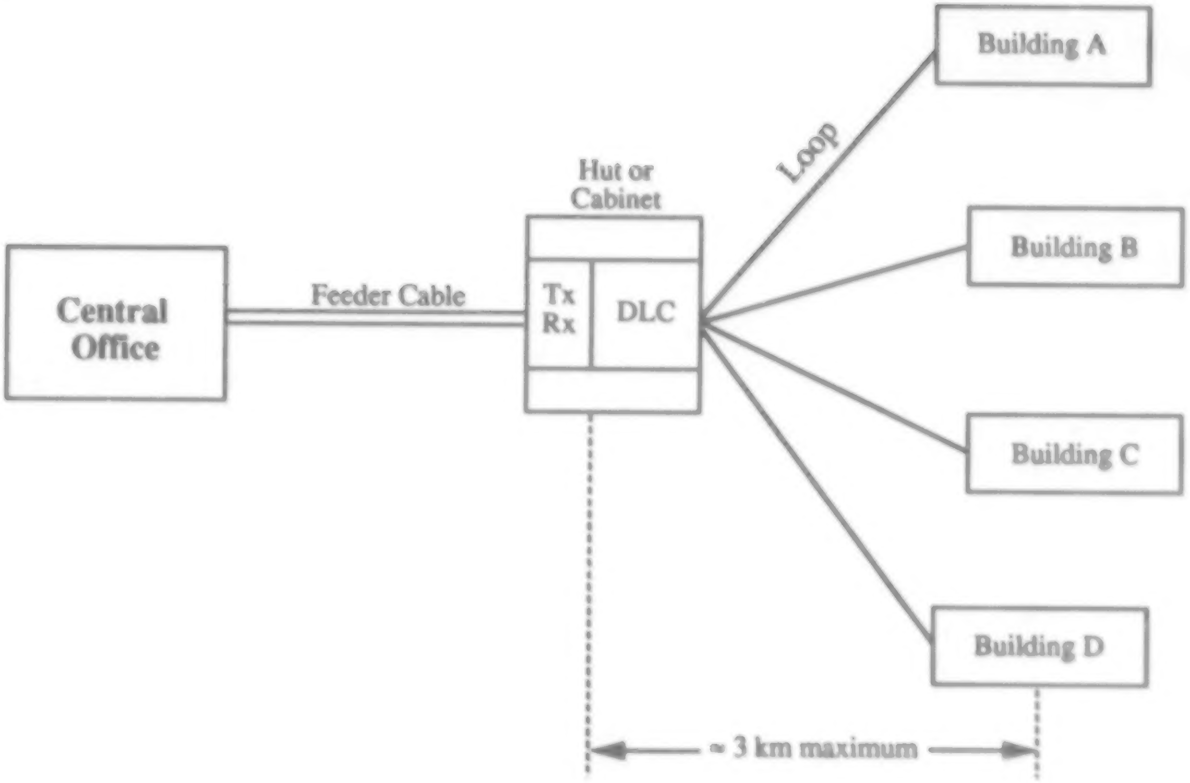
1.1.3 Residential Urban and Suburban Network Configuration

The typical residential application in a non-rural environment is based on a DLC with a copper- or fibre-based feeder link. More than 90% of the feeder links are less than 15 kilometres in distance from the CO with the majority between 5 and 10 kilometres. The maximum distance on the loop side is approximately 3 kilometres. Each service area provides local telephone service to a maximum of 500 to 600 residential subscribers.

The cost structure of this configuration is:

- A total estimated cost of $1225 per line with 500 lines served with a 5-kilometre feeder link from the CO to the remote.
- Initial capital investment breakdown:
    - outside plant cable: 18%
    - transmission link including multiplex equipment and outside plant housing: 49%
    - distribution loops: 33%

Figure 3
Telephone Company Local Network in an Industrial Park


Building A
Loop
Hut or Cabinet
Building B
Central Office
Feeder Cable
Tx
Rx
DLC
Building C
Building D
≈ 3 km maximum

1.1.4 Residential Rural Network Configuration

A rural residential configuration is represented on Figure 4.[4] In general, the density of subscribers does not warrant the installation of a DLC although some manufacturers offer low modularity DLCs for these particular applications (e.g. less than 100 lines). Multi-party lines are uncommon (i.e. more than one customer per line) since rural modernization programs implemented in the 1980s have increased the percentage of rural subscribers served by a single-party line. Distances to the subscribers vary substantially in a rural environment and loop lengths quite often exceed 10 kilometres and can even reach 50 kilometres in some cases.

The cost structure of rural applications is:

- A total estimated cost of $3510 assuming a feeder distance of 15 kilometres and a distribution loop length of 5 kilometres.
- Initial capital investment breakdown:
  - outside plant cable: 85%
  - distribution loops: 14%
  - junction wire interface: 1%

1.1.5 Conclusion

The cost per line of the access network increases dramatically between downtown business applications and those in more distant or less populated areas. At the same time, the cost structure shifts from being equipment intensive (66% of the capital investment) in downtown business applications to cable intensive (85% of the capital investment) in rural residential applications.

1.2 Existing Cable Company Local Network Architectures

1.2.1 Traditional Coaxial Cable Network

Traditional cable television networks are designed starting with a head end where all the video signals are assembled (received either from satellite, local studios, microwave or from off-air broadcasts or video tapes) to be distributed to the customers along a tree-and-branch configuration using coaxial cable trunks, feeder links and drops as depicted on Figure 5.[5] A head end can provide service for hundreds of thousands of subscribers. For example, the Rogers

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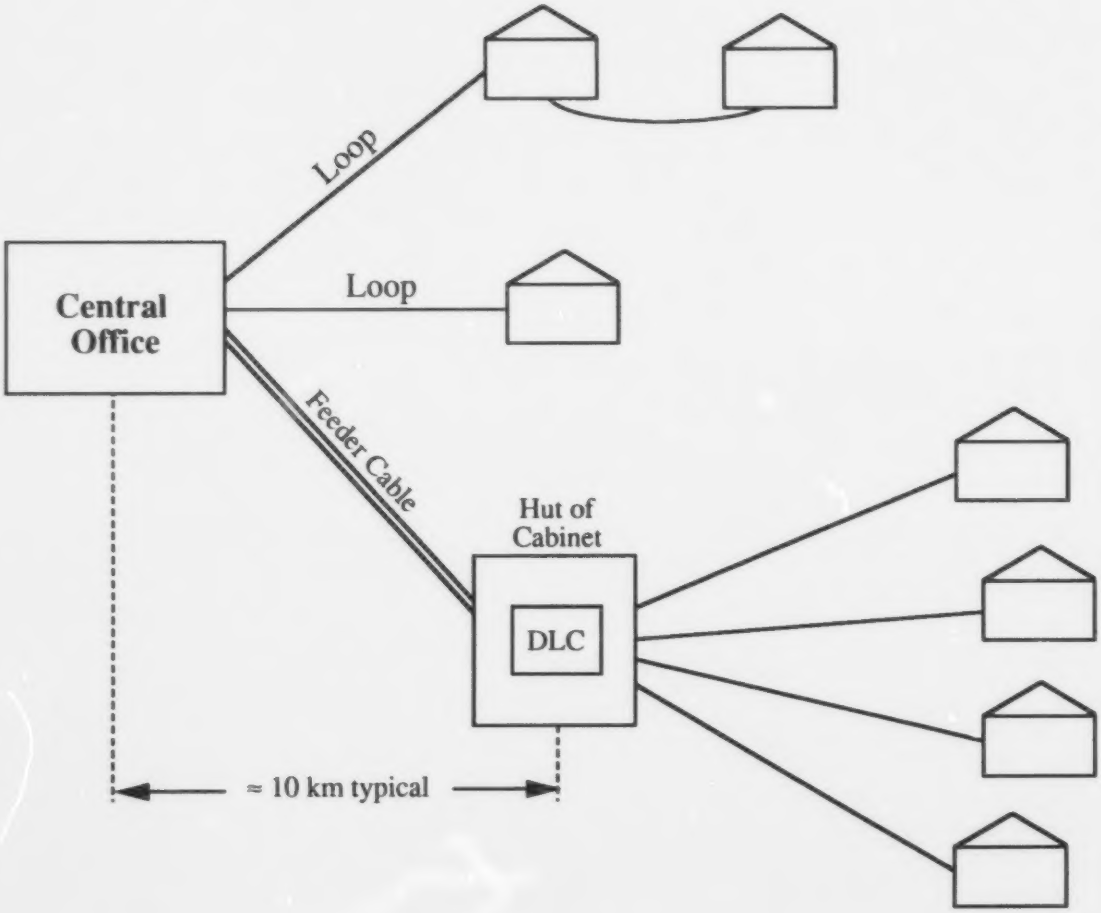
[4] DTI Télécom.

[5] DTI Télécom.

Figure 4
Telephone Company Local Network for a Rural Residential Application


Loop
Central Office
Loop
Feeder Cable
Hut of Cabinet
DLC
≈ 10 km typical

Toronto/Peel head end serves 600,000 subscribers as does the Vidéotron head end in Montreal/Pie IX. The design of cable television networks is optimized for one-way transmission from the head end to the subscriber. Transmission technologies are based on analog amplitude modulation. The trunk and feeder amplifiers maintain the signal levels at a pre-determined quality level. Power stations are required approximately every three kilometres of cable to multiplex the electrical power onto the coaxial cable to drive the amplifiers. The limit on the number of channels is based on the bandwidth of the amplifiers. Systems operating at 300 MHz have a capacity of 36 NTSC channels while those being upgraded to 550 MHz carry up to 78 NTSC channels. The upper limit in bandwidth of coaxial cable results from the increasing signal loss as the bandwidth increases. For practical cable television applications and current technology, without even taking advantage of video digital compression, this correspond to a capacity of approximately 150 NTSC channels.

Similar network architectures are used whether the subscribers are in urban, suburban or rural locations with the major difference being in the distances covered and consequently the number of amplifiers required.

All cost details are provided in Annex B.

The cost structure of a coaxial tree-and-branch network is:

- A total investment per subscriber is approximately $500 for a new 550 MHz system.
- Initial capital investment breakdown:[6]
    - trunk and feeder cables: 42%
    - components (amplifiers, power system, taps, etc.): 16%
    - drop and subscriber premise equipment: 42%

1.2.2 Hybrid Fibre/Coaxial Cable Networks

Many different configurations have been proposed for hybrid fibre/coaxial cable television networks. These configurations generally have in common that fibre optic transmission is used in the trunks and feeders to spread the cost of the electro-optic converters among a sufficiently large number of subscribers, position the cable system for future evolution and therefore maximize the benefits. Among others, are the ATC (1988) backbone architecture as shown in

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[6] David P. Reed, *Residential Fiber Optic Networks*(Artech House, 1992), p. 316.

Figure 5
Tree-and-Branch Coaxial Network

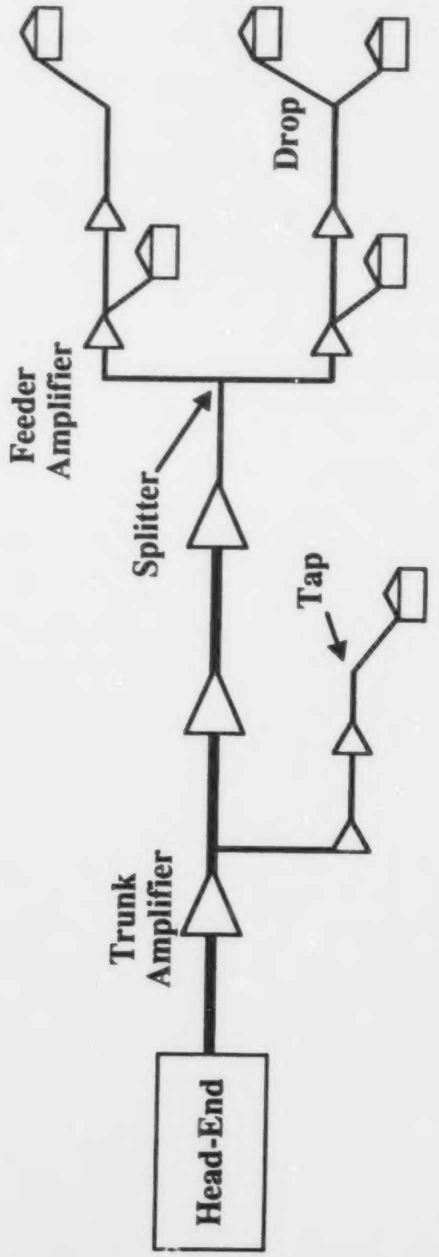
Head-End
Trunk Amplifier
Tap
Splitter
Feeder Amplifier
Drop

Figure 6[7] and a more recent proposal for a 1 GHz digital cable television system (Figure 7).[8] In ATC 88 the cost of the fibre trunk backbone was estimated at $36 U.S. per subscriber[9] of which approximately 50% was for the cable. This compares to an estimate of approximately $23-$25[10] per subscriber on a coaxial tree-and-branch network for the trunk cable portion.

The cost structure of a hybrid fibre/coaxial cable network is estimated to be:

- A total investment of approximately $475[11] per subscriber.
- Initial capital investment breakdown:
  - trunk and feeder [illegible]bles: 38%
  - components (amplifiers, power system, taps, etc.): 15%
  - drop and subscriber premise equipment: 47%

A study by Rogers Engineering[12] yielded similar results. The cost of a fibre to the bridger architecture (complemented by a 1 GHz coaxial tree-and-branch architecture to the subscriber) was estimated at $345 per subscriber. This excludes the cost of the fibre backbone from the head end to the secondary hub. If a figure of $130 per subscriber is used for this portion (see next section on the Rogers' fibre ring backbone network), the total amounts to $505 per subscriber.

Cable television local networks have also evolved to the fibre-based, star-shaped architecture coupled with a coaxial tree-and-branch network. This configuration is shown in Figure 8,[13] representing an overview of the network that Vidéotron is currently building in the U.K. This approach has the advantage of building in the capability to offer bi-directional telecommunications services in the future.

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[7] P. Chiddix, D. Pangrac, "Fiber Backbone: A Proposal for an Evolutionary CATV Network Architure", *1988 NCTA Technical Papers*, Cable '88, Washington, D.C., 1988.

[8] Gary, Kim " Rochester build could test limits of cable bandwidth", *Lightwave*, January 1992, p. 6.

[9] Claude T. Baggett, "Cost Factors relative to the Fiberoptic Backbone System", *NCTA '88 Technical Papers*, National Cable Television Association, Washington, D.C., 1988.

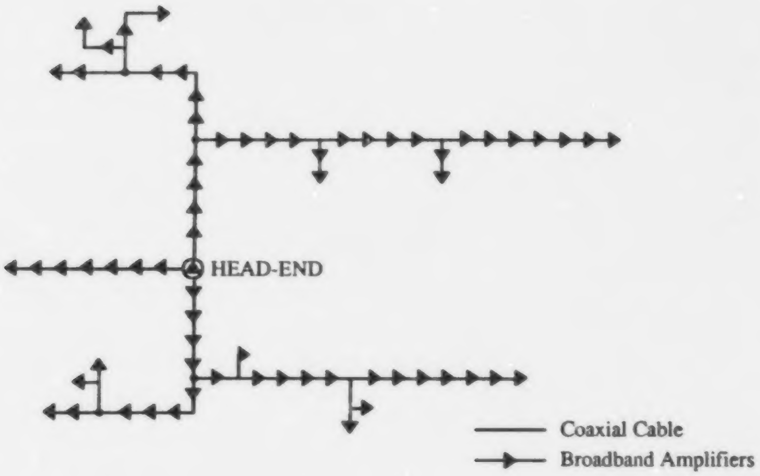
[10] See note 6, p. 316.

[11] *Idem.*

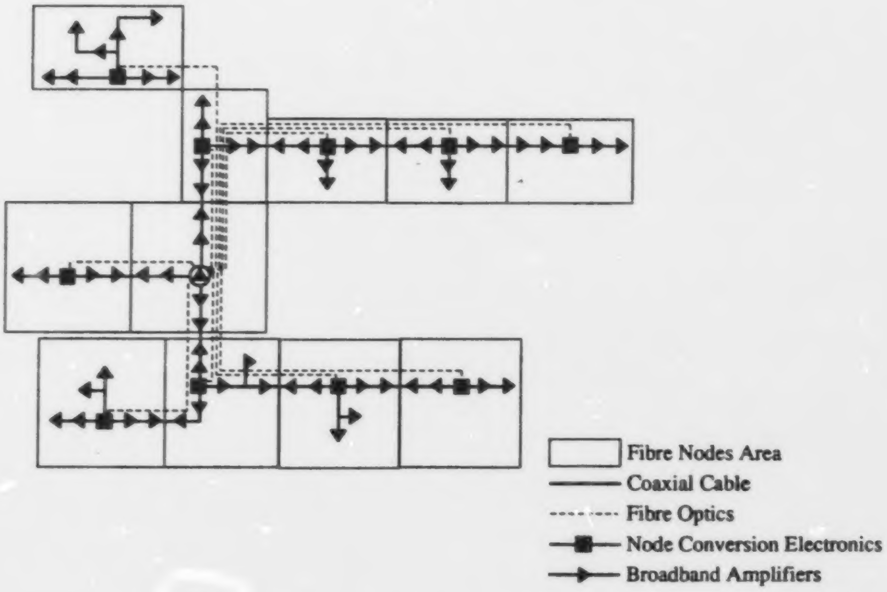
[12] N. Hamilton-Piercy, R., Balsdon, *Prospects for Fiber to the Home*, Rogers Engineering, presented at the International Television Symposium and Technical Exhibition, Montreux, Switzerland, June 1991.

[13] *The successful building of a cable television network*, Vidéotron, September 11, 1991, Figure 1.

Figure 6
ATC Backbone Architecture

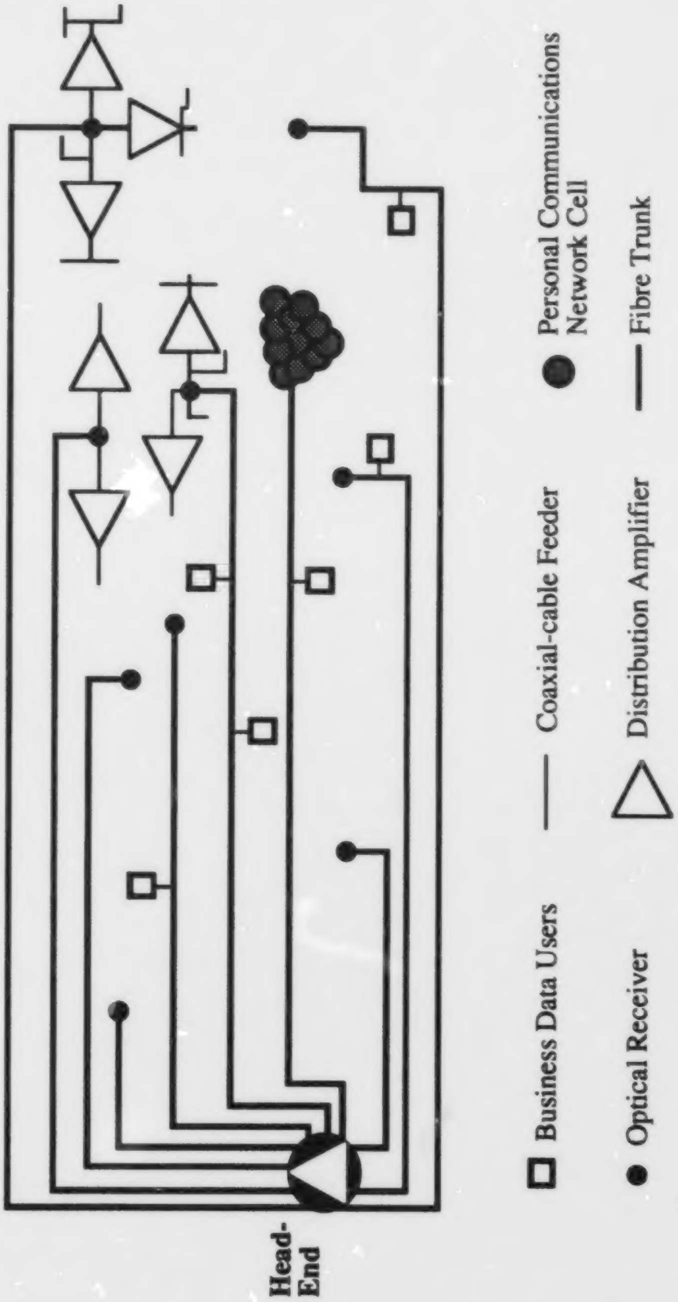

HEAD-END
Coaxial Cable
Broadband Amplifiers

Typical Cable Television System


Fibre Nodes Area
Coaxial Cable
Fibre Optics
Node Conversion Electronics
Broadband Amplifiers

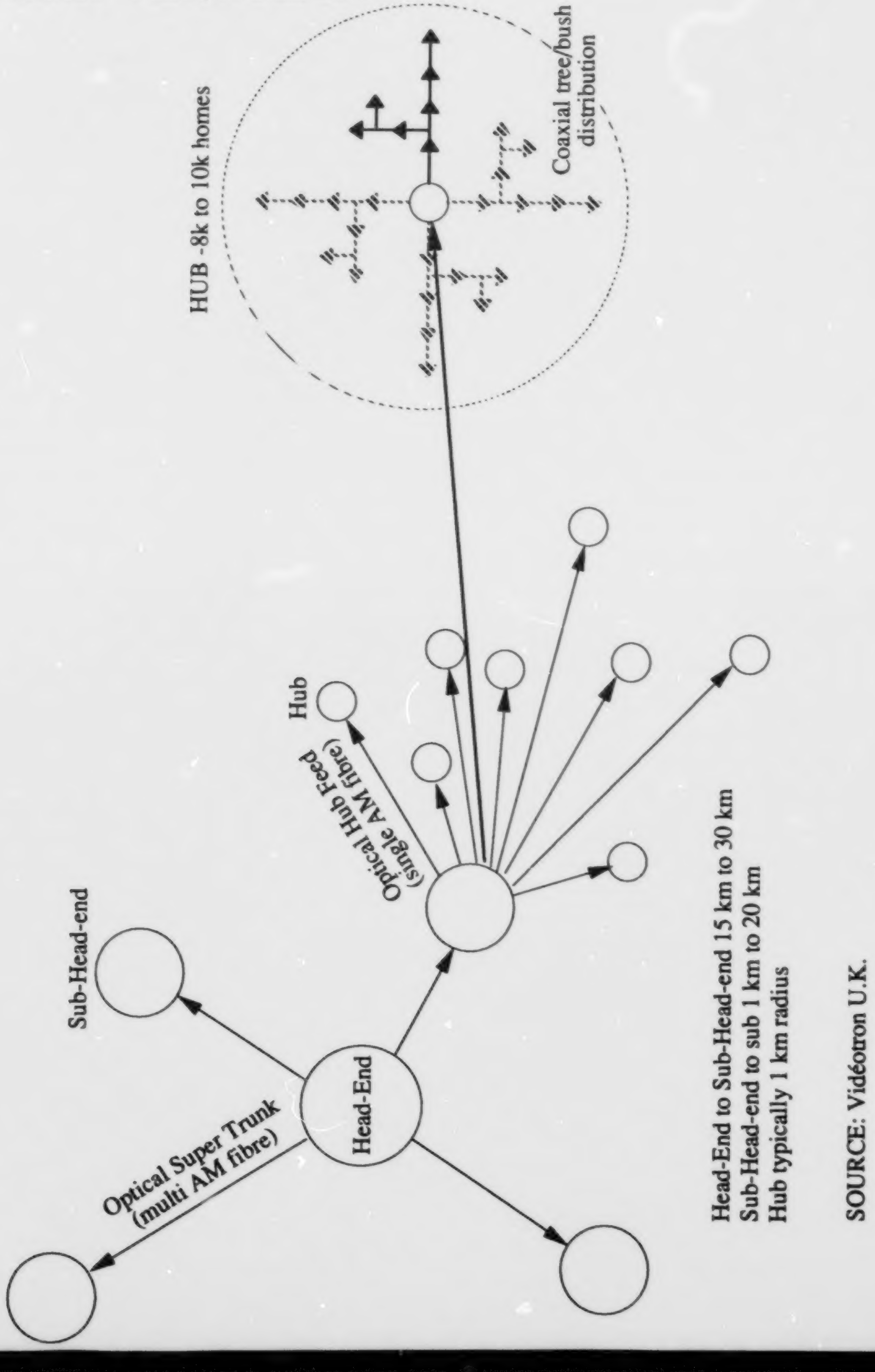
Hybrid Fibre Optic Backbone/Coaxial Distribution System

Figure 7
1 GHz Network by ATC in Rochester, New York


Head-End
□ Business Data Users
— Coaxial-cable Feeder
● Personal Communications Network Cell
● Optical Receiver
△ Distribution Amplifier
— Fibre Trunk

SOURCE: *Lightwave*, January 1992

Figure 8
Network Overview - Vidéotron in the U.K.


HUB -8k to 10k homes
Coaxial tree/bush distribution
Hub
Optical Hub Feed (single AM fibre)
Sub-Head-end
Head-End
Optical Super Trunk (multi AM fibre)

Head-End to Sub-Head-end 15 km to 30 km
Sub-Head-end to sub 1 km to 20 km
Hub typically 1 km radius

SOURCE: Vidéotron U.K.

Figure 9
Regional Head end Application

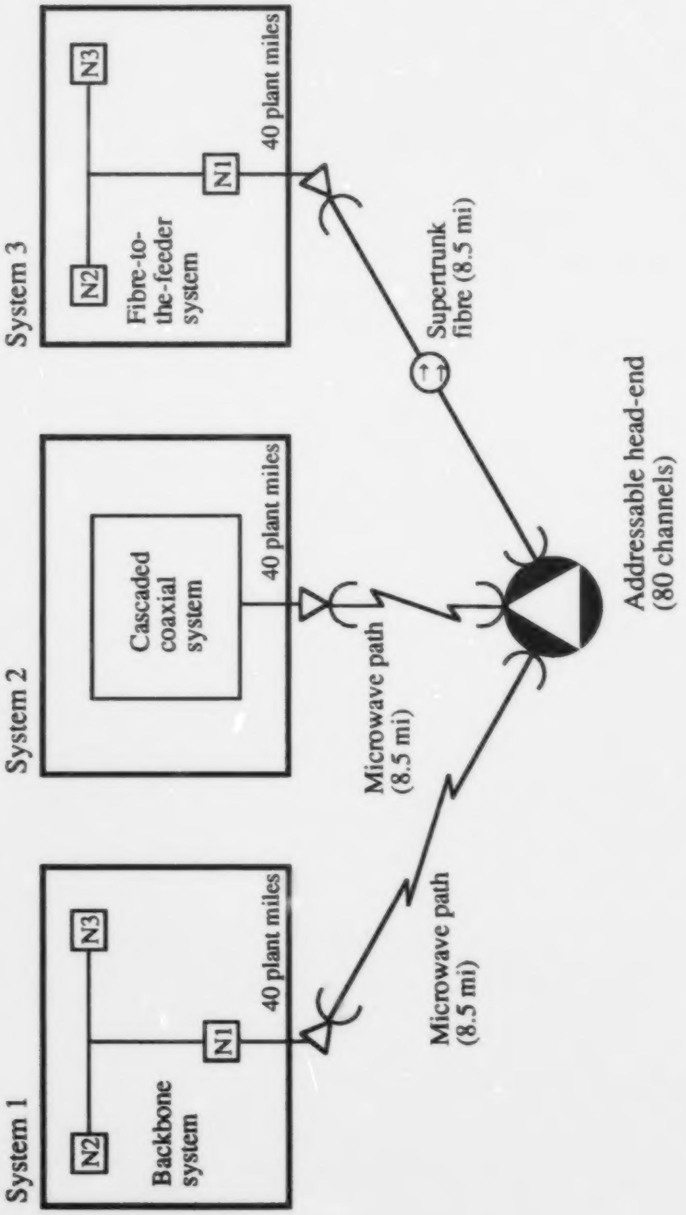
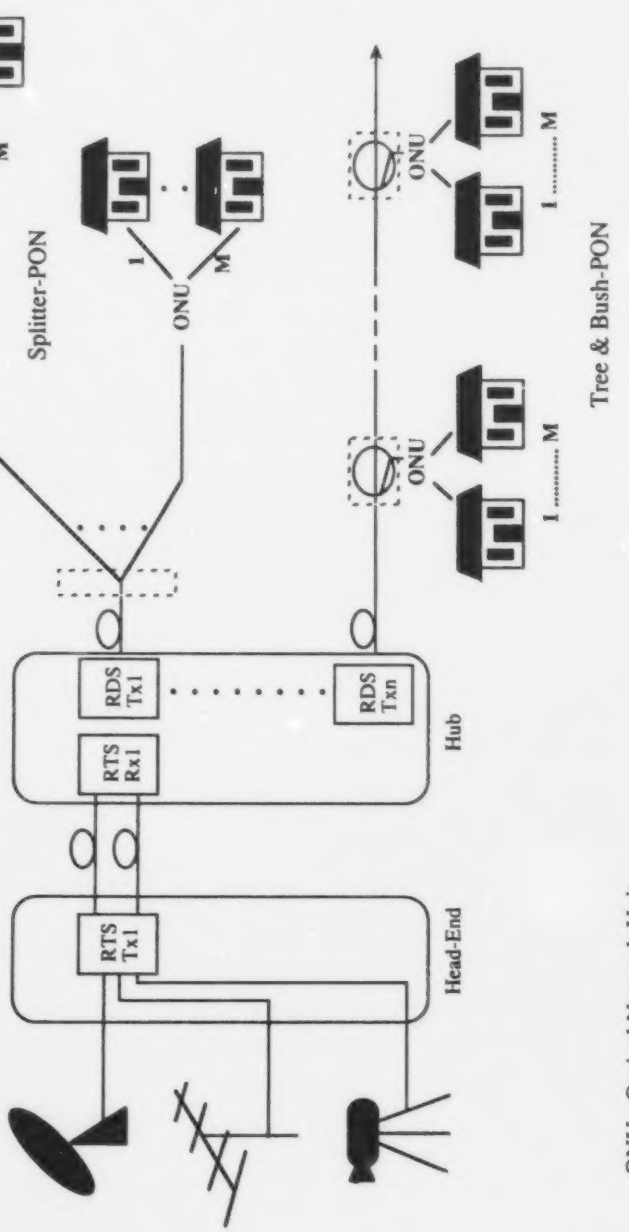

System 1
N2
N3
N1
Backbone system
40 plant miles
System 2
Cascaded coaxial system
40 plant miles
System 3
N2
N3
N1
Fibre-to-the-feeder system
40 plant miles
Microwave path (8.5 mi)
Microwave path (8.5 mi)
Supertrunk fibre (8.5 mi)
Addressable head-end (80 channels)

Figure 10
Raynet Distribution System (RDS)


Splitter-PON
ONU
1
M
ONU
1
M
Tree & Bush-PON
ONU
1 .... M
ONU
1 .... M
RDS Tx1
RDS Txn
RTS Rx1
Hub
RTS Tx1
Head-End

ONU : Optical Network Unit
PON : Passive Optical Network

1.2.3 Regional Head ends

Figure 9[14] depicts an alternate architecture using both fibre optic and microwave supertrunks to connect a variety of systems to a regional head end. The technology of AM microwave has improved substantially over the years and is now able to offer 550 Mhz bandwidth for 80 NTSC channels and thus competes efficiently with a fibre optic supertrunk. This architecture answers the needs for increased reliability, improved noise and distortion characteristics and increased bandwidth while spreading the cost among a number of systems. Furthermore, each system can maintain its own configuration while benefiting from the improvements provided by the regional head end and supertrunk facilities.

2.0 EVOLUTIONARY NETWORK TRENDS

2.1 Architectural Trends

Up to the early 1980s, the typical architectures of both the local telephone and cable television networks were markedly different. The telephone company network was single star-shaped, narrow bandwidth and bi-directional (as shown on Figure 1) while the cable television networks were based on tree-and-branch configurations and provided unidirectional broadband transmission i.e. broadcast (as shown in Figure 5).

In recent years, technological advances and competitive pressures have resulted in rapid evolution of the local networks for both operators. Telephone company networks are now built with a variety of configurations from the double star (shown of Figure 3) to a mix of star shape and bus configurations (see Figure 10[15] depicting the Raynet architecture implemented by the Deutsche Bundespost) to provide for broadband services. The drive toward the Integrated Broadband Network (IBN) is a critical element in justifying the new telephone company architectures. Fibre-to-the-Home (FTTH) and Fibre-to-the-Curb (FTTC) architectures have been proposed and Bellcore has issued its first Technical Advisory for Fibre-in-the-Loop (FITL), as depicted on Figure 11. The services supported by FITL range from the provision of voice to Switched Multimegabit Digital Service (SMDS) with DS-1 access.[16]

Star/bus architectures are also being explored in cable television networks as with the regional head ends and fibre supertrunks shown in Section 1.2. For the cable television company, these new architectures provide an answer to the requirement for improved system performance and reliability while increasing the potential bandwidth of the network (1 GHz) and building the

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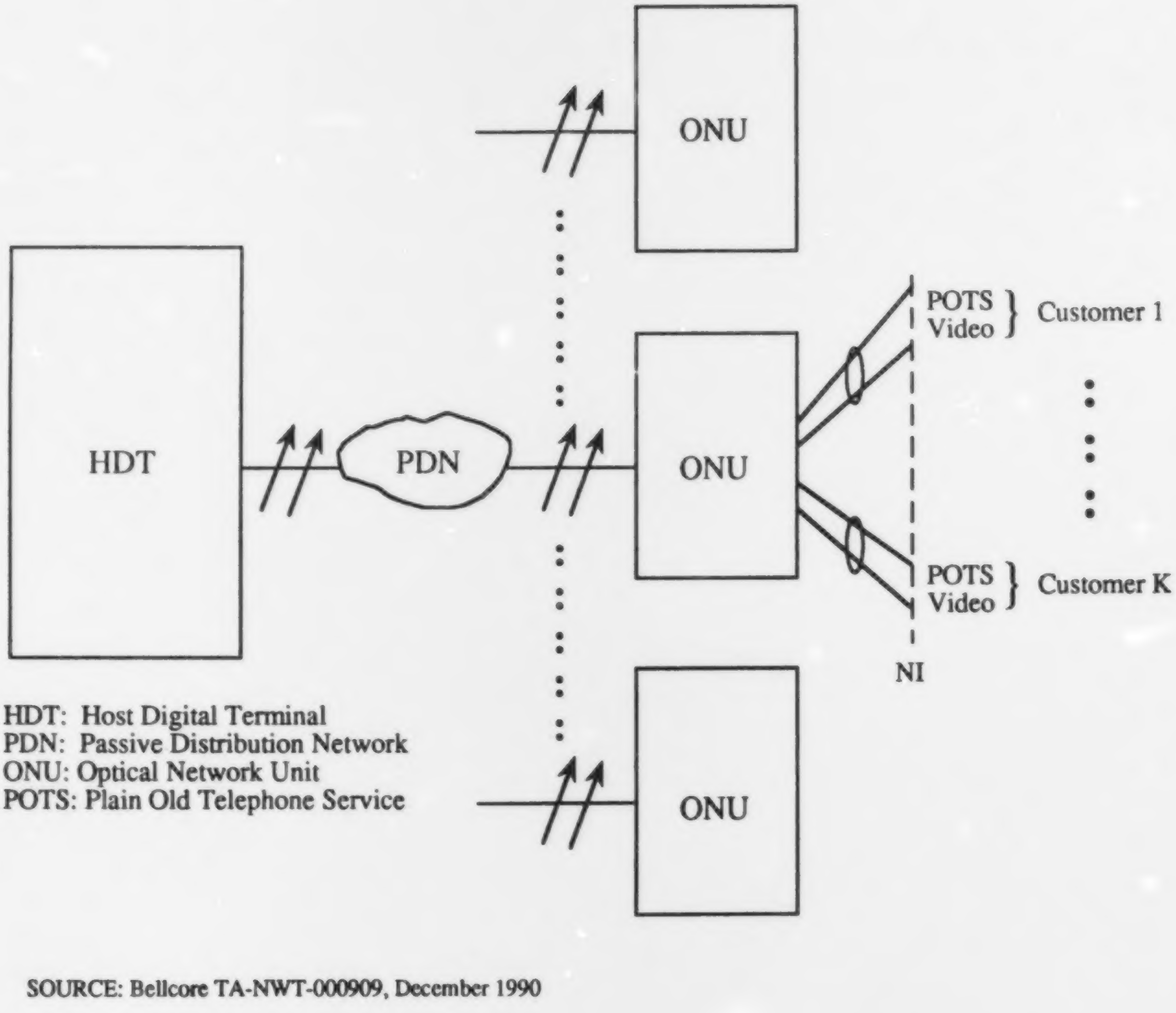
[14] T.M. Cordova, "Small system operators: Economically keeping up with today's design choices", *Communications Technology*, December, 1991, p. 26.

[15] *The Cable Telco Report*, A Publication of Dawson Communications, January, 1992, p. 4.

[16] Bellcore, *Generic Requirements and Objectives for Fiber In The Loop*, TA-NWT-000909, Issue 1, December 1990.

Figure 11
Generic FITL By Bellcore


ONU
HDT
PDN
ONU
POTS
Video
Customer 1
POTS
Video
Customer K
NI
ONU
HDT: Host Digital Terminal
PDN: Passive Distribution Network
ONU: Optical Network Unit
POTS: Plain Old Telephone Service

SOURCE: Bellcore TA-NWT-000909, December 1990 capabilities for bi-directional interactive broadband services that would eventually compete with the telephone companies' IBN.

Ring configurations as shown in Figure 12[17] have also gained in popularity among both telephone companies and cable operators. The main advantages of ring networks are improved network reliability, robustness and cost efficiency with respect to capital investments in cable and equipment. Telephone companies have been implementing ring configurations in their core network since the late 1980s.

A fibre ring configuration was developed by Rogers Cablesystems and implemented in the Toronto area as a backbone architecture to provide up to 150 NTSC channels with a fibre/coaxial cable hybrid arrangement as shown on Figure 13. A key feature of this architecture is that the urban area is segmented in cells of 10,000 subscribers which "fits well with cellular telephone cell density, so shared networks with cellular operators are feasible".[18] Rogers quoted the incremental cost of this fibre backbone configuration as $130 per subscriber.

It is expected ring architectures will migrate to the local networks through the 1990s as the technology and applications mature for telephone companies and cable television operators alike.

2.2 The Correlation Between Technologies and Services

Table 1 highlights the relationships between the different types of services offered by telephone or cable television operators and the enabling technology necessary to offer these services. Emphasis is placed on emerging and future services as this is what could likely cause the convergence between local telephone networks and cable television networks to take place.

2.3 Technology Trends

There have been three major trends in the technology deployed in telephone and cable television networks since the early 1980s. In telephone networks, foremost is the digitization of the switching and transmission networks. The increasing penetration of fibre optic technology has had major impacts on both the telephone and cable television networks. Wireless technologies with the implementation of cellular networks and the increasing use of cordless telephones have also tremendously increased the pervasiveness of telecommunications in business as well as personal activities.

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[17] See note 1.

[18] G. Hart, N. Hamilton-Piercy, *Rogers Fiber Architecture*, (Canadian Cable Television Association Technical Papers, 1989), p. 50.

Figure 12
Telephone Company Migration to Ring Networks

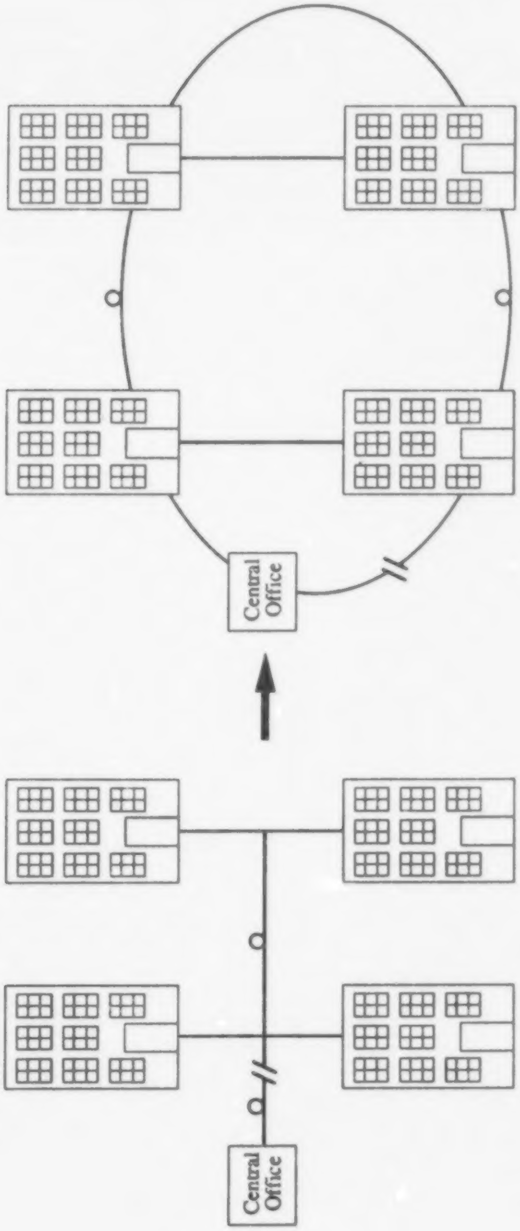
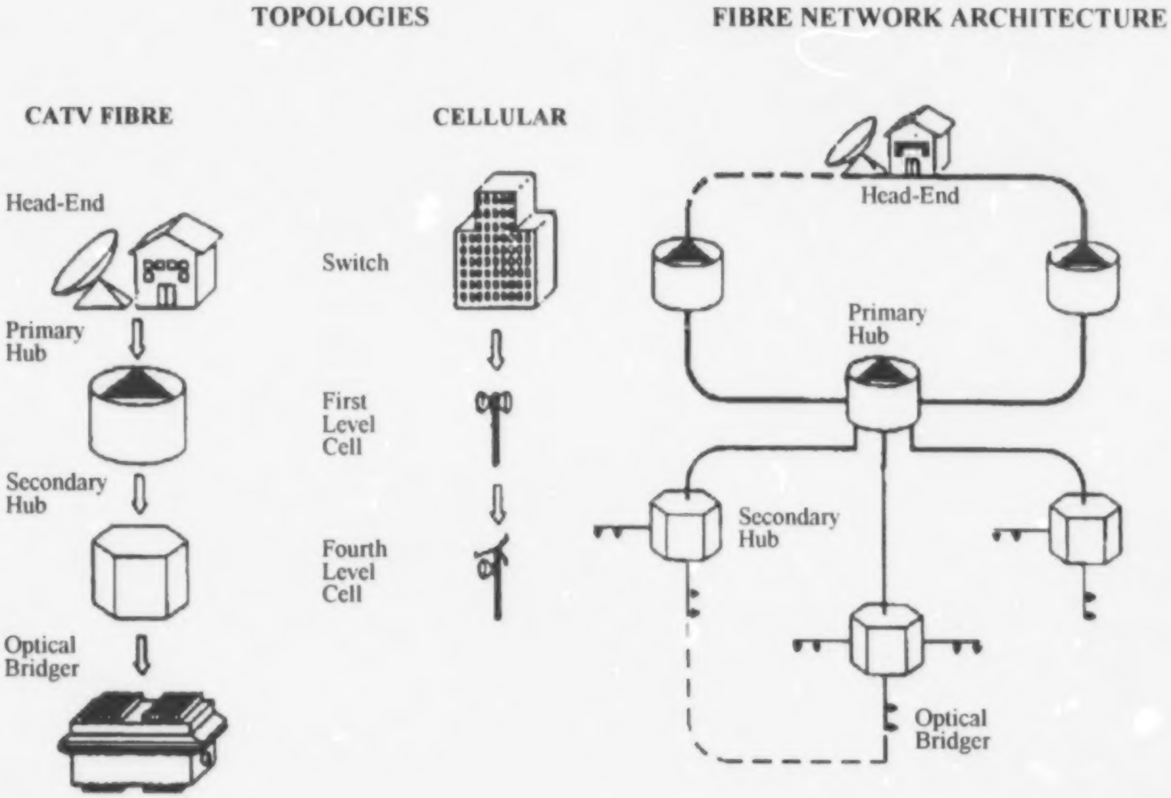

Central Office
Central Office

Figure 13
Rogers Architecture



TOPOLOGIES

FIBRE NETWORK ARCHITECTURE

CATV FIBRE
Head-End
Primary Hub
Secondary Hub
Optical Bridger
CELLULAR
Switch
First Level Cell
Fourth Level Cell
Head-End
Primary Hub
Secondary Hub
Optical Bridger

SOURCE : CCTA Technical Papers, 1989

Table 1
Service versus Technology Relationship in Local Distribution Networks

SERVICE	TECHNOLOGY
Voice	Analog or digital (ISDN)
Packet switched data[1] - up to 56Kbit/s - up to 1.5 Mbit/s - up to 45 Mbit/s - > 45 Mbit/s	 Frame relay[2] SMDS (cell relay) ATM (cell relay)
Circuit switched data[1] - up to 2*64 Kbit/s (data or digital voice) - up to 1.5 Mbit/s	 ISDN BRA (2B+D) (Basic Rate Access) ISDN PRA (23B+D) (Primary Rate Access)
Telecommuting	Switched voice and data, packet switched data (ISDN BRA & PRA)
Videoconference and Business Television	Bi-directional links Circuit or cell switched Fibre optics Satellite, coaxial cable, microwave
Basic Cable Television	Unidirectional Channel selection at the terminal Coax, fibre optics, microwave
Pay Television	Broadcast channel selection at terminal Decoder/descrambler/filter (Interdiction) Unidirectional Coax, fibre optics, microwave, satellite (DBS)
Switched Video - Near Video On Demand (NVOD) (e.g. 100 channels with every top 10 movies starting every 10 minutes) - Video On Demand (VOD) (Instantaneous access to any one of a very large number of programming channels available, e.g. 300 channels) - Video dialtone	 Bi-directional or unidirectional links Broadband switching Fibre optics, coax, satellite (DBS) Bi-directional links Broadband switching IBN, fibre optics, and BISDN

Notes:

[1] Data also includes digitized voice signals.

[2] Frame relay has been defined by the CCITT and by ANSI T1.606 as an ISDN bearer to serve LAN interconnection and existing host computer environments. The frame relay standard was designed to develop the backbone technology which will evolve toward cell relay and thus SMDS(Switched Multimegabit Digital Service) and ATM (Asynchronous Transfer Mode). SMDS is a service concept sponsored by Bellcore based on the IEEE 802.6 standard. ATM is envisioned as the basic building block for BISDN (Broadband ISDN) to handle all types of traffic from voice, video and image to framed data. The deployment of digital switching and fibre optic technology has also spurred technologies such as digital video compression and fast packet switching to support broadband services. Advances in the transmission of amplitude modulated broadcast signals over optical fibres have been a major driving force for the penetration of fibre optic technology further into cable television networks.

2.3.1 Digital Switching

In Canada, the level of network modernization is one of the most advanced in the world with, for example, approximately 65% of the Bell Canada local switches digital by 1991. The vast majority of toll switches are already digital. These digital switches are also being equipped with common channel signalling and ISDN software. Bell Canada has introduced ISDN Primary Rate Access (1.5 Mbit/s) and submitted rates to the CRTC for Basic Rate Access (144 Kbit/s). Broadband ISDN is under ongoing definition and new technologies (such as Switched Multimegabit Data Service) are being hailed as its first implementation. Switching technology has also evolved to provide for switching of 1.5 Mbit/s signals now going up to the 45 Mbit/s range soon and 150 Mbit/s in the medium term with cell switching technology.

2.3.2 Fibre Optics in Telecommunications Networks

Fibre optics was introduced into the telephone network in the early 1980s. It was first installed in the toll and interoffice core networks operating a 6 Mbit/s and then 45 Mbit/s. Its implementation in local feeder links began in the mid 1980s as the technology matured and costs started to decrease. Nowadays, fibre optic feeder links directly to a business customer's premises usually operate at 45 Mbit/s or 155 Mbit/s, while systems at 622 Mbit/s and 2.4 Gbit/s are installed in the core network (see Figure 14).[19]

Fibre optic technology is also being deployed by telephone companies in FTTH and FTTC field trials to provide narrowband and broadband telecommunications services. Approximately 30 such field trials have been undertaken in the U.S. since 1988. The primary objective of these trials is to bring the fibre close enough to the home to take advantage of its enormous bandwidth to eventually provide services ranging from telephone service to video entertainment services. Some of these trials have involved the joint provisioning of telephone and cable television services such as the Consortel trial in Rimouski, undertaken by Québec-Téléphone with the participation of Cogeco.

Passive optical networks (PONs) are presently one of the important network approaches emerging from these trials. PONs are being heavily promoted in Europe and Japan. Raynet is one of the North American companies most involved in this type of network. PONs can be used in either star-shaped or bus architectures. They make extensive use of the properties of light (such as the ability to tap or split a portion of an optical signal with a prism or grating). Their major limitation is the loss in signal power through the passive components (i.e. not requiring electrical powering) from which this technology derives its name.

As fibre optic technology evolves and matures, industry wide standards are also emerging. The most important is the Synchronous Optical NETwork (SONET) which was adopted by the American National Standards Institute (ANSI) with input from the major manufacturers and telephone companies. Fibre optic standards are also developing globally since the Europeans have aligned their own standards for synchronous optical transmission named Synchronous

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[19] See note 1.

Digital Hierarchy (SDH) with SONET. The major benefits of these standards are expected to be cost reductions in the equipment due to both a simplification of the high speed signal multiplexing and demultiplexing processes and the economies achievable with the very high component volumes expected. The second major benefit is loosely termed "mid span meet" i.e. the ability to interconnect fibre optic transmission equipment from different vendors.

2.3.3 Fibre Optics in Cable Television Networks

Fibre optic technology started to penetrate cable television networks in the mid 1980s, and this evolution is indicated in Table 2:[20]

Table 2
Evolution of Fibre Optic Technology in Cable Television Networks

° **Generation 1:**	**Fibre Optic Supertrunk (1985)** To replace frequency modulated coaxial cable supertrunks
° **Generation 2:**	**Fibre to the Hub (1990)** Replace coaxial cable trunks
° **Generation 3:**	**Fibre to the Bridger (1991)** More flexible system architecture Deep broadband fibre penetration
° **Generation 4:**	**Compressed Broadcasts (1993)** Compressed digital video Capacity is doubled to 4 channels/6 MHz bandwidth
° **Generation 5:**	**Compressed High Definition Television Broadcasts (1995)** One HDTV channel/6 Mhz bandwidth

In the U.S., a recent paper released by the National Cable Television Association (NCTA) reveals that 370 cable systems serving more than 13 million subscribers are using fiber optic cable.[21]

There are two major differences between the majority of fibre optic systems installed for cable television applications compared to telephony. The first one is that cable television systems typically provide for unidirectional i.e. broadcast applications, although this may change in the future. The second one is that the most up-to-date and cost-effective technology available in 1992 is based on analog amplitude modulation techniques. The single critical element of this technology is the Distributed Feedback (DFB) laser. Current amplitude modulation technology effectively handles up to 550 MHz bandwidth from a single laser and manufacturers are now looking to go beyond to 1 GHz to offer 150 NTSC channels.

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[20] Siemens Stromberg-Carlson as quoted by Michael Fahey, "Cable TV finds new revenues in fiber," *Lightwave*, January 1992, p. 22.

[21] *Fiber Optic News*, March 23 1992, p. 6.

2.3.4 Broadband Services Technologies

Fibre optics and digitization have enabled the development of technologies to offer wideband and broadband services. Figure 15[22] provides an overview of the introduction of these technologies in telephone networks. The key technologies, Asynchronous Transfer Mode (ATM), Frame Relay and Switched Multimegabit Data Service (SMDS), have one thing in common: they are based on fast packet switching technology. They differ in the speeds involved (ATM and SMDS operate at 45Mbit/s and higher and Frame Relay at up to 1.5 Mbit/s) and in the way the data packets are handled for transmission.

2.3.5 Digital Video Compression

Digital video compression techniques are also being perfected for broadcast, business television and videoconference applications. An uncompressed NTSC digital video signal requires 76 Mbit/s for broadcast quality. Codecs (coder/decoder) available for the last few years provide broadcast quality transmission at 45 Mbit/s compatible with the standard DS-3 format, and therefore are ready to use in a switched telephone network or in digital fibre trunks for cable television systems. A major driving force of the need for digital video compression is the trade-off between the cost of bandwidth and the cost of digital signal compression. Both costs have been decreasing rapidly in recent years as fibre optic transmission and codec technologies mature.

Codecs operating at 1.5 Mbit/s provide a signal quality equivalent to that of a VCR. It is expected that video compression techniques will be able to compress high-definition television signals from the 600 Mbit/s to 1 Gbit/s range down to 10 Mbit/s.[23] Standards are under development at the CCITT to provide a compression ratio of 180:1 for future multimedia services such as business television and videoconference for business or residential applications. Switched video service with images equivalent in quality to those of a VCR could then be provided on a DS-1 link on a copper pair.[24] It would then be conceivable to offer switched video services (e.g. video dialtone) to the residential market without the requirement for fibre-to-the-home. In a similar vein, AT&T has recently announced a $1500 U.S. Videophone[25] operating over ordinary telephone lines (64 Kbit/s).

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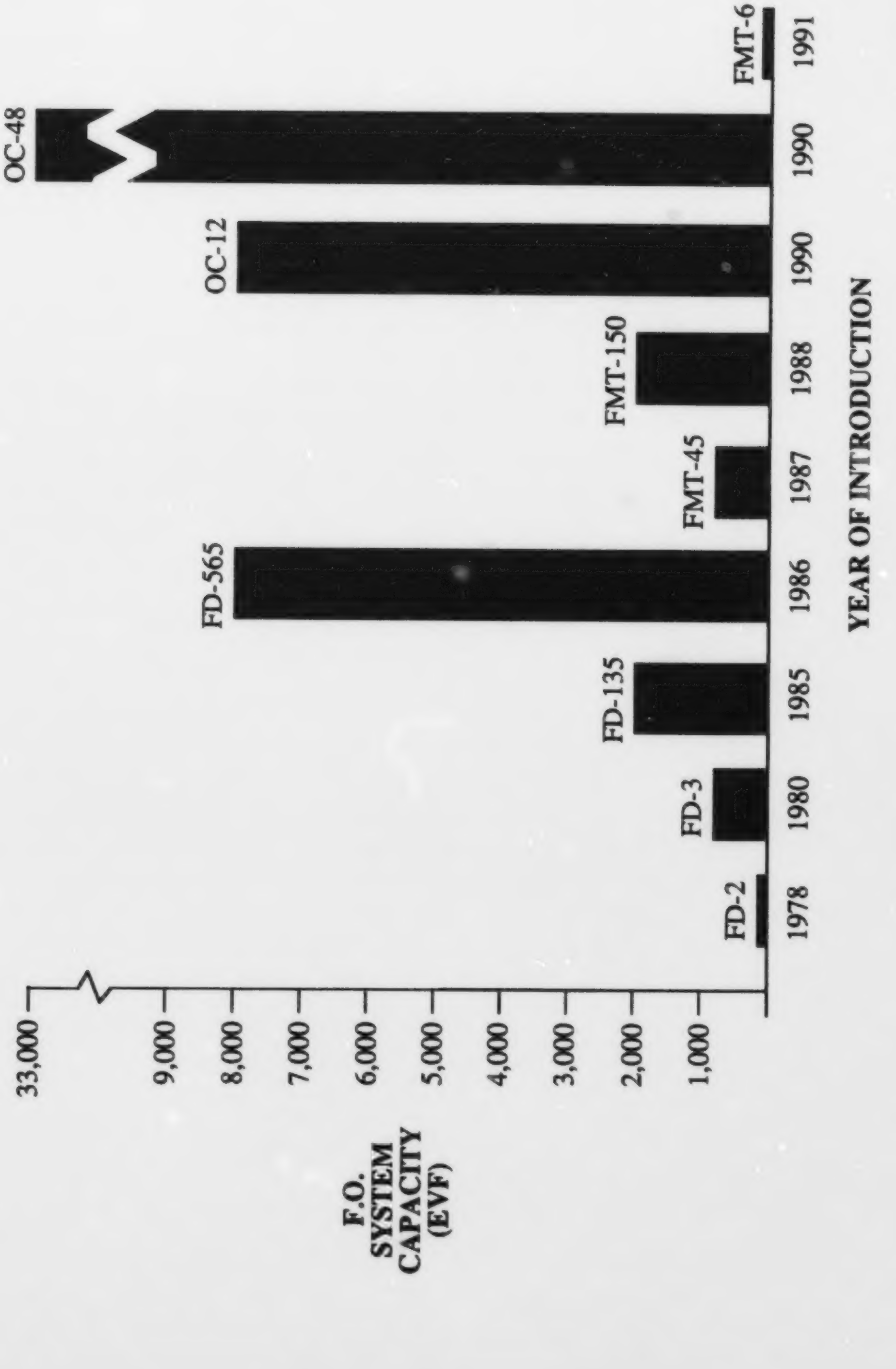
[22] DTI Télécom.

[23] See note 6, p. 154.

[24] B. Prasada, Bell-Northern Research, Montreal, presentation entitled *Technology Evolution for Multi Media Services*.

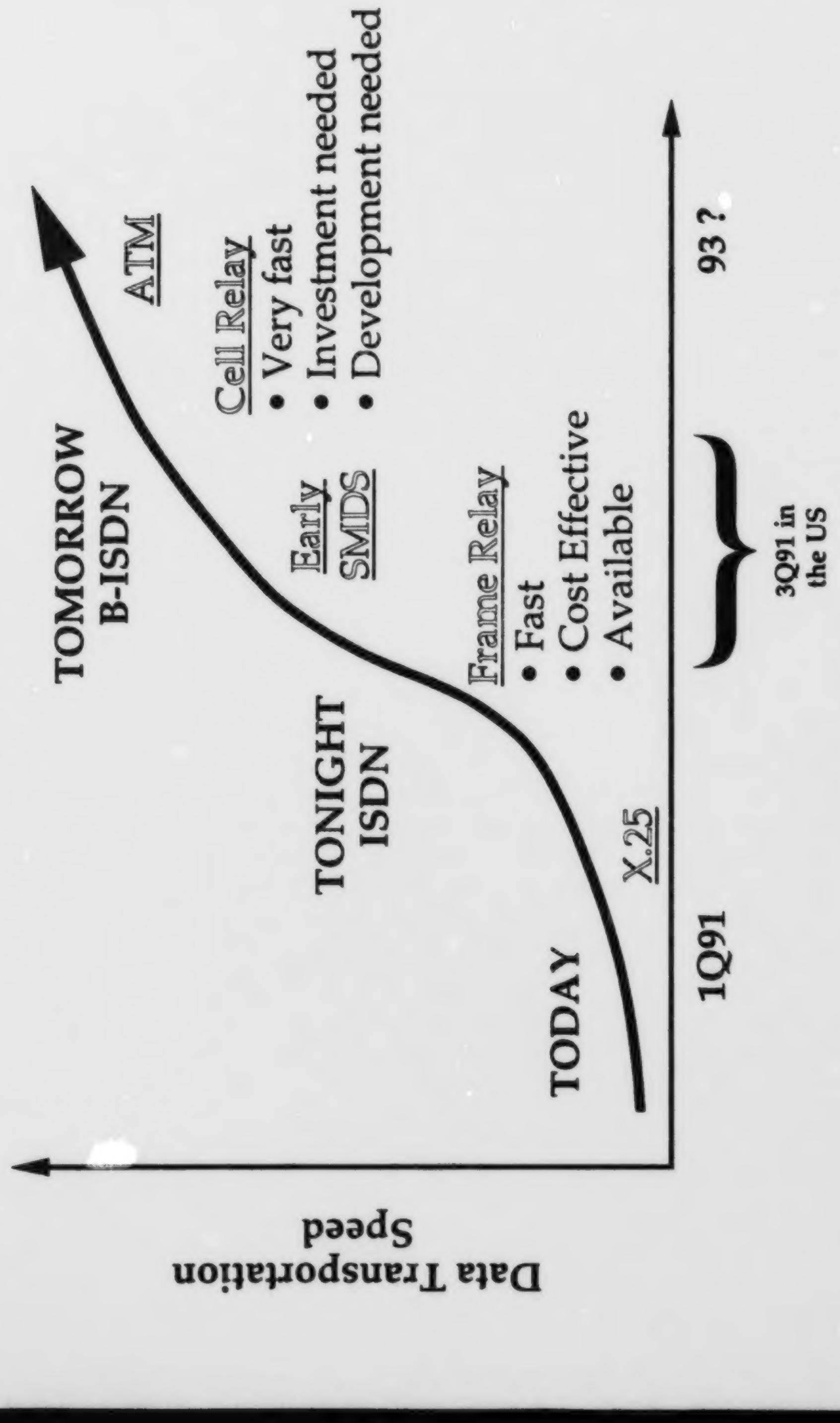
[25] William M. Bulkeley, "The Videophone Era May Finally Be Near, Bringing Big Changes," *Wall Street Journal*, March 10, 1992, p. 1.

Figure 14
Fibre Optic Transmission System Capacity



EVF: Equivalent Voice Frequency

Figure 15
ISDN and Packet Switching Evolution



2.3.6 Wireless Technologies

Cellular networks established in the mid 1980s have enjoyed tremendous growth and drastically altered the landscape of telecommunications. The technology is now evolving toward the Personal Communications Network (PCN), based on the use of thousands of microcells grouped closely together. With PCN, instead of calling a number which is attached to a particular location, one would call a person using his or her unique Personal Identification Number (PIN) and be able to reach that person anywhere in the world where the service exists.

Another approach to the evolution of wireless technologies has been cordless telephones and the "telepoint" concept, where base stations linked to the public switched telephone network and/or to the cellular networks provide service to multiple handsets operating in a specified area. Cordless telephone technology has yielded truly portable handsets weighing only a few ounces.

Related standards have been under development. These include for cordless telephones CT2, CT2Plus and CT3 and for digital cellular technologies GSM for Groupe Speciale Mobile. CT2Plus has been proposed by major Canadian concerns and has been adopted as the Canadian standard for PCTS (Public Cordless Telephone System). CT2Plus provides for roaming in the office environment and for two-way telepoint capabilities.

Multichannel Multipoint Distribution Service (MMDS) has been a key microwave technology used to offer wireless cable television broadband services. MMDS systems in the U.S. can offer up to 31 broadcast NTSC channels to the home without the need for expensive cable plant. In Canada, 15 channels have been assigned for television broadcast services.

Direct Broadcast Satellite (DBS) could eventually prove to be a major competitor for cable television, although the recent failure of a major DBS venture has cast some doubt on its future potential. DBS is based on using advanced digital compression technologies to provide a large number of broadcast channels (e.g. 108 in the case of Sky Cable). Once in place, a DBS system, by virtue of its nature, would provide access to a large number of subscribers over a very large geographic area.

A Canadian offshoot of SkyPix is planning to offer DBS services in Canada in the near term. Called the Aladdin project,[26] the system will digitally deliver to the home a personal entertainment service on a pay-per-view basis. SkyPix will initially broadcast 80 channels. The maximum system capacity is expected to be 250 channels. Each digitized video channel is compressed to 2.2 Mbit/s (1.8 Mbit/s for picture and 0.4 Mbit/s for stereo audio).

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[26] *The Aladdin Project Ltd., SkyPix: An Overview*, from the Office of Wilson Markle, ATV Program Manager, Telesat Canada.

3.0 CONSIDERATIONS OF ECONOMIES OF SCOPE IN LOCAL NETWORKS

3.1 Overview of Opinions Expressed

Much has been written and said in recent years about the potential existence of economies of scope in local telephone and cable television networks. Some of the opinions expressed as part of the consultations of the Local Networks Convergence Committee are reproduced below to provide a flavour for the discussions that have been held.

- Bell Canada: "It is certainly possible that technological and market factors could lead to a single carrier situation in certain market areas, i.e. a single fibre to the home. While Bell considers this a possible alternative, it does not expect such a scenario to evolve to any significant degree in the next decade."[27] Bell also adds that: "However, in the long run, Bell Canada expects that evolving integrated networks may exhibit significant economies."[28]

- Rogers Communications Inc: "The critical point is that with high channel capacity, it is not necessary to have a unique physical path to each subscriber in order to deliver VOD . . . . Therefore, it seems likely that if there is a demand for VOD, it can be more cheaply and rapidly provided by the cable company than by the telephone company."[29]

- Ed Tel: "The optimum solution for Canada in the issue of Local Networks Convergence is the development of a single integrated network and the competitive delivery of services over this network."[30]

- Québec-Téléphone: "The company believes that it will be possible, through a joint local distribution network, to make substantial economies of scale and of scope."[31]

In the United States where this debate has also been ongoing for quite some time, the NTIA (National Telecommunications and Information Administration) Infrastructure Report published in October 1991 provides a good summary of the opinions put forward to date, such as:

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[27] Comments of Bell Canada, Department of Communications, Discussion Paper #3, October 15 1991, p. 9.

[28] Comments of Bell Canada, Department of Communications, Working Paper #4, January 7 1992, p. 7.

[29] Rogers Communications Inc., Letter from Mr. Michael Allen, Vice-President Regulatory Affairs, dated January 14 1992, p. 2.

[30] Responses to Notes & Questions for Local Networks Convergence Committee Consultations, Working Paper #4, Ed Tel, January 1992, p. 9.

[31] Local Distribution Telecommunications Networks, Answers of Québec-Téléphone to the Questions of Working Paper No.4, January 15 1992, p. 11.

- Bell South stating that "telephony, high speed data, and video all share the same transport medium in an integrated switched broadband network, an economy of scope will exist for each of these service capabilities";[32] and
- GTE stating that "an integrated switched broadband network would permit substantial economies of scope . . . by permitting a far larger number of products and services . . . to be provided over the integrated facility."[33]

On the other hand, others such as Hatfield Associates, and Johnson and Reed point out that the technical feasibility of the IBN is not well established and that the combined cost of separate narrowband and broadband networks are lower than those of an IBN offering the same services.

The analysis of the potential for economies of scope in this study was conducted along the following lines.

Firstly, it is based on an analysis of the cost structure of both the telephone and cable companies and of the comparison in total average investment per line in the case of a new build. Secondly, the impact of the current telephone and cable local networks is discussed. For each case, new build or existing network, the opportunities for economies of scope are discussed with respect to the physical network infrastructure and the transmission portion of the network. Furthermore, the potential for economies of scope in end-user terminals is reviewed before drawing final conclusions.

3.2 Comparison of Telephone and Cable Cost Structures in New Builds

3.2.1 The Importance of Each Cost Component

It is usually agreed that the average local network investment per line is twice as high for telephone companies as it is for cable television companies (i.e. less than $500 per line for cable television and more than $1000 per line on average for the telephone companies). The causes for this difference can be traced back to the different network architectures, the technologies available and to the expectations in terms of network performance, customer service and reliability that have guided the implementation of each network.

Traditional telephone and cable company networks also exhibit differences in how the local network cost is partitioned between cable and equipment (as estimated in Sections 1.1 and 1.2). Table 3 illustrates these differences. Support structure, customer drop and terminal equipment costs are not included in this comparison.

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[32] *The NTIA Infrastructure Report*, October 1991, p. 228.

[33] *Idem.*

Table 3
Local Network Cost Differences

	Cable Company Coaxial Network	Telephone Company Network	
		Business	Residential
	Percentage (Cost)	Percentage (Cost)	Percentage (Cost)
Cable	40% ($200)	22% (≈$200)	18% (≈$225)
Equipment	< 15% ($ 75)	66% (≈$600)	48% (≈$600)

The most pertinent comparison is probably between the cable television coaxial tree-and-branch network and the star-shaped telephone network for residential applications in urban and suburban environments. In both cases, the cable represents a substantial portion of the total investment (20% to 40%).

It is in the interest of each network operator to maximize the return on investment obtained from these facilities. This can be done in two ways:

- the costs to build and maintain the facility can be reduced; and
- the revenues generated by the facility can be increased.

Both courses of action can be undertaken on their own or in parallel.

The easiest way to reduce the costs of the facility is to share it with another operator and thus benefit from economies of scope without actually having to expand operations into new business segments. This type of activity is already under way such as with the joint use of pole lines, underground conduits and buried customer drops. However, more could probably be done such as the application of the cable condominium concept which is discussed in Section 3.2.3.

To increase the revenues generated by the facilities, each network operator could charge more for its existing services and/or expand its product line to offer new services. The second option is where an opportunity to benefit from economies of scope exists. Up to now, the architecture of both the telephone and cable television networks was a major impediment to a horizontal expansion of their respective product lines. However, as both operators implement fibre optic technology further into their networks, similarities between both networks and their capabilities in terms of service offerings increase rapidly. This was certain recognized by cable television firms striving to include the capability to provide for bi-directional services (e.g. Vidéotron's Videoway Phase II and the cable television/telephone network that they are building in the U.K.). Operating under these conditions, cable television supertrunks, trunks and telephone company feeder links have a lot in common. The implementation of ring architectures in the core networks of both operators further corroborates this view.

A note of caution is required at this point. The fact that both network operators can eventually expand their service offerings does not necessarily mean that there is one ubiquitous network configuration which will be more cost effective. As an example, the fact that telephone companies can gear up to provide for bi-directional digital video services over T1 facilities of near broadcast quality in the future does not imply they would be in the best position to offer cable television services. The convergence seen in network architectures is not yet applicable to the equipment required to efficiently meet the requirements of telephone and cable television applications. Cable television transmission is analog and unidirectional, even when fibre optic links are deployed in local networks, while telephone company transmission is bi-directional and digital, at least up to the DLC, increasingly in the case of lines servicing business customers. There appears to be little opportunity for economies of scope in equipment, at least until the technology to provide an IBN or the cable television equivalent is available. This is not expected to occur before the end of this decade and is speculative even as to which of the telephone or cable companies will be in the best position to provide it in either business and/or residential areas. It is therefore beyond the scope of this Appendix to attempt to answer this question, especially in view of the rapid evolution of technologies and networks in recent years.

However, even now, there is a wide variety of video-based services that telephone companies could develop and supply to their traditional business customers and for which their network architecture (including the core) may be well optimized. A similar argument applies to the provision of narrowband bi-directional services by cable companies with their existing network architecture.

3.2.2 Potential for Economies of Scope in the Physical Support Structure in New Builds

This Section provides further details on how economies of scope are realized in terms of the physical support structure (i.e. poles, conduits and cables) and how the situation could evolve in the next few years to maximize these economies.

Telephone and cable companies already make use of joint facilities in terms of poles and conduits. Unless the capacity of these facilities nears exhaustion or becomes difficult to use, there appear to be economies of scope in using a single infrastructure.

In the case of pole lines, environmental and aesthetics factors (and often municipal regulations) also militate in favour of a unique support structure for a variety of services.

Underground conduits are the type of support structure where it is expected that the highest level of economies of scope may exist but also where separate structures, and thus duplication, may be more frequently justified. This can be explained by two factors:

(1) Conduits are used in areas of higher density, and exhaustion or near exhaustion of the facilities is often encountered due to the large number of cables which have been placed over time; and,

(2) Access to conduits is more problematic than access to poles, and each company may feel that it should have its own infrastructure in order to minimize wasteful

signal loss resulting from inefficient routing, or to keep the control within its realm.

In the case of a new build, telephone and cable companies often join forces to minimize installation costs. It costs much less to hire one crew to place two or three cables in one trench than to hire one crew two or three times to trench and place one cable each time.

The current situation in terms of structure ownership is usually that the telephone company owns or controls the infrastructure which it then leases to the cable company. As an example, prices of approximately $5/pole/year have been quoted.[34] Each operator owns its cables and electronic equipment. There have been signs of confusion or tension in recent years from certain cable television operators claiming that their telephone company counterpart is not always as positively disposed as it should be for joint planning of facilities.

3.2.3 Joint Use of the Fibre Cable Sheath

Proposals such as the condominium approach have been made that could help circumvent the above issues and enable both operators to maximize their potential economies of scope by relieving the pressure to add more support structures. As explained by Richard McCormick, CEO of U.S. West, the condominium approach is "ownership, on a condominium basis, of a facility where the use of that facility is at the discretion of the owner . . . . Think about a common sheath that has several fibers in it. My view is we could own half that sheath, the cable company could own the other half. As in a condominium . . . the sheath is maintained and the right of way is protected."[35] With this concept, the physical support structure is owned jointly and maybe could be administered by a separate group mandated by both owners while each company retains full control over its portion of the cable. Therefore, this would result in additional economies of scope since not only the physical support structure is shared but also the cable itself.

As an example of potential cost savings in a residential suburban environment, the total cable costs for a 5-kilometre fibre optic telephone company feeder link (48 fibres) plus a 5-kilometre cable company fibre trunk (24 fibres) would amount to approximately $190,000, including installation. If a single 72-fibre cable were to be installed instead, the total cost would be $155,000 or a combined saving of 19% on this cable portion. In terms of savings per subscriber, and based on a *pro-rata* allocation of 48 fibres to the telephone company and 24 to the cable company, this would result in a cost saving of approximately 4% for the telephone company (assuming 500 subscribers served) and 2.5% for the cable company (assuming 1024 subscribers served) in initial capital investment per subscriber. The details of this calculation are provided in Annex C.

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[34] Submission to the Local Networks Convergence Committee, "*Local Networks Convergence: A Canadian Communications Policy toward 2001*", Le Cable de Rivière du Loup Ltée, Pierre Simon, October 15, 1991, p. 3.

[35] "The Condo Approach to Telco Entry", *Cable Magazine*, February 1992, p. 27.

Additional savings related to the support structure (poles, conduit) and to maintenance of facilities are not included in this analysis and represent further benefits from the cable condominium approach. Furthermore, joint planning and ownership of cable facilities raises the possibility that the total number of fibres required to meet the needs of both operators could be rationalized (less spare fibres required, as an example), resulting in additional potential cost reductions.

3.3 The Case of Two Existing Networks

Telephone company local networks have been in place and evolving for approximately 100 years and cable company networks for close to 40 years. This section addresses the issue of how the existing networks and their operational practices have an impact on both telephone and cable operators in taking advantage of the potential economies of scope. The section also addressed trends in this area.

First, an important distinction must be made. The telephone network covers both residential and business subscribers and derives the majority of its revenues from the latter. The cable television market is almost exclusively focused on the residential subscribers. This difference has a major impact on how and why investment decisions are made as highlighted below.

3.3.1 Physical Infrastructure and Network Topology

As reviewed in Section 1.0, existing local telephone and cable network topologies are markedly different, the former being based on a star architecture and the latter on a tree-and-branch configuration. This leaves little room for synergy or economies of scope between the two network types, other than sharing of physical support structures (poles and conduits, installation costs) and perhaps cable (the condominium approach for fibre optic cables) on the routes or portion of routes that coincide. Furthermore, the differences between the two networks are maintained even up to the subscriber drop, i.e. the cable section linking the last network junction point to the subscriber location as shown on Figures 1 and 5.

Cable companies have a coaxial broadband transmission facility up to each residential subscriber. In addition, fibre optic cable is being used extensively in their networks, with many operators now upgrading their local networks to install fibre optic cables in the trunk portion. One such example is Rogers Cable with its proposed Fibre-to-the-Bridger configuration.[36]

The telephone companies have a copper link to each residential subscriber (limited to a maximum of 1.5 Mbit/s), and they have also started deploying fibre optic cables in their local networks, most notably in the feeder section.[37]

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[36] See note 12.

[37] A presentation provided to the Local Networks Convergence Committee by Bell Canada states that 20% of 1990 cable expenditures in the feeder section were for fibre cable versus 0% for the distribution (from the jumper wire interface to the subscriber).

This could pave the way for sharing of facilities between the two operators. However, the large majority of the fibre feeder cables installed by telephone companies to date serves the needs of large business customers located in downtown areas or in industrial parks. Some DLCs in residential areas are equipped with an optical link back to the CO. However, due to the relatively long feeder length required to prove in a fibre cable over its copper counterpart (over 3 kilometres in general), these applications are mostly found in the case of new builds.

Therefore, for existing networks, the possibility of sharing the cable between telephone and cable companies may be limited in the near to medium term due to the different applications of fibre optic in the local network of each operator.

In many established neighbourhoods, the installation of telephone copper wire preceded the installation of coaxial cable by many years. Although the poles lines or underground conduits can and are being shared by these two operators, there are usually two cable drops leading to a residence, each with different entry points. Therefore, a major portion of each network in terms of its relative investment does not offer much potential for economies of scope.

In the case of the telephone company network, feeder cable leading to the jumper wire interface (JWI) where a DLC may be located will serve up to 600 residential subscribers. Each distribution cable between the JWI and the pedestals will handle from 12 to 50 subscribers.

On the other hand, the trunk cable in a cable television network can handle in excess of 2000 subscribers, the feeder cable more than 100 and the last junction point, the splice pedestal, is based on a modularity of 4 to 8 subscribers (compared to 12 to 50 for the telephone company).

This difference in modularity makes it difficult to design pedestals and cable sheaths that could be used in existing installations to meet the requirements of both networks without necessitating a complete redesign of the distribution plants, and thus negating the benefits of potential economies of scope.

As cable companies upgrade their existing networks by installing fibre optic cables further toward their customers and as the cost of telephone company fibre feeders continues to decline and it becomes attractive to modernize the majority of their existing residential networks, the opportunities for achieving economies of scope resulting from the joint use of physical support structures and similarities in network topology will increase. However, this potential does not appear to be fully exploitable to a significant degree before the year 2000.

3.3.2 Network Modernization and Upgrades

Telephone and cable companies can benefit from economies of scope when they upgrade or modernize their plant simultaneously. For example, these economies result from the use of a single installation effort (e.g. labour, equipment, coordination activities, etc.) to place both cables in the same conduit.

However, telephone and cable companies react to different triggers when making decisions to modernize or upgrade their local networks. In the case of a telephone company, for residential service, growth in the number of subscribers or cost savings resulting from more efficient technology will justify investments in fibre optic cables and DLCs. A new feeder route may be required if a new sectionalization of subscribers is needed.

For a cable company, a requirement for an increase in the number of channels (e.g. from 40 to 78) is the most likely trigger for a plant upgrade in existing residential areas. Unless a fibre cable is added to the upstream portion (i.e. close to the head end) of the local network, the investment would need cover only new amplifiers and additional channel modulators.

The likelihood that the investment requirements of the telephone and cable company will occur closely in time is fairly limited, since they relate to different service and economic imperatives.

If either operator were to defer or advance a plant upgrade to coincide with the other's activities, the economic justification for the project may be reduced and result in a loss of operational flexibility. Furthermore, this may have a negative impact on the level of service offered to customers.

A cost-benefit analysis could be conducted to determine the point at which the benefits of economies of scope outweigh other costs incurred. Such an analysis would need to include, for example, the impact of investing funds earlier than planned if a project is advanced, or the impact of delaying investment if a project is deferred, the lost revenues if upgrades are not made exactly when customers require them and they then decide to forgo the purchase of a new service, the increases/decreases in operational costs (such as repair and maintenance) incurred if a project bringing in more efficient technology is deferred or advanced, etc. These costs vary on a case-by-case basis and would therefore require extensive study for general conclusions to be reached.

As long as the justifications for plant upgrades or modernization do not change, the potential for economies of scope in these activities are estimated to be minimal and result from chance or *ad hoc* activities as opposed to planning. This may happen in the longer term if telephone companies start deploying the IBN in existing residential local networks. However, as noted in Section 3.2, the feasibility of the IBN is still considered speculative.

3.3.3 Equipment and Network Performance Requirements

There are major differences in the types of equipment used by both telephone and cable companies in the performance levels expected by their customers.

Telephone company equipment is mostly digital, for switching and transmission, while cable companies employ mostly analog transmission. The telephone company equipment for residential subscribers is optimized to provide switched narrowband services, whereas the cable company equipment is for non-switched broadband services. The telephone company link from the CO to a residential subscriber has at most a DLC as active equipment. The cable company link, however, from the head end to a subscriber is characterized by active amplifiers at regular intervals.

Customer expectations in terms of network performance also differ, being much higher for telephone service than for cable television. Telephone companies have developed the technology and the operational methods to be able to detect, locate, identify and repair failures in their local networks rapidly and efficiently. Cable television operators often rely on the customers to call and inform them of a low signal quality or loss of signal and then send a technician to check the amplifiers along the link.

In the telephone network, functions such as billing are an integral part of the service and the information provided is generated by the same equipment controlling the service, the CO switch. In a cable company, a simple stand-alone computer with a customer database generates the billing without linkages back to the equipment providing the service.

The equipment and performance requirements of current local networks of both the telephone and cable companies do not appear to offer possibilities for economies of scope in the near to medium term.

The increasing efficiency of digital video compression may one day result in digital technologies being the mainstay for both the telephone and cable networks. Then, the possibilities for economies of scope, resulting from the same type of equipment being used in telephone and cable networks, will be increased.

3.4 Potential for Economies of Scope in Terminals

The potential for economies of scope in end-user terminals has yet to be widely discussed. However, developments in multimedia terminals are a step toward achieving these economies. A few examples are therefore discussed in a qualitative manner.

A multimedia terminal is usually defined as a piece of equipment which will support various modes of communications i.e. voice, data and image (or video). Presumably, it should be possible to achieve economies of scope by integrating these different functions into one unit as opposed to having 3 or 4, each requiring its own powering scheme, user interfaces, packaging, etc.

Personal computers with integrated facsimile cards as an option have been offered for a few years and represent a first level of integration of two communications means. As an example of the cost benefits that can be reaped from this integration, the facsimile card for a MacIntosh computer sells at a retail price of approximately $400 while a low cost facsimile machine sells at approximately $800.

Recent advances in digital compression techniques have resulted in product offerings which provide some level of integration between voice, data and video. The AT&T Videophone announced recently [38] at a retail price of $1500 is a first product offering in North America. Based on the same technology, Compression Labs has announced the Cameo Personal Video

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[38] Wall Street *Journal*, March 10, 1992, p. 1.

System, Model 2001,[39] which integrates, although not completely, a small video camera atop a MacIntosh personal computer. Coupled with an external video processing module and an ISDN card in the computer, this product in essence provides videoconference capabilities using the screen of the personal computer.

3.5 Conclusions

The potential to benefit from economies of scope in the existing telephone and cable television networks appears to be limited to the physical support infrastructure in the short to medium term. However, similarities between the architectures of telephone and cable local networks are rapidly increasing as fibre optic technology is deployed further into each network. This increases the opportunity for economies of scope for both operators, especially in the case of new builds.

These economies can be achieved by sharing cable sheathes and support structures such as pole lines and underground conduits. It has been estimated, based on the initial cost of the fibre cable for feeder (telephone company) or trunk applications (cable company), that telephone companies could save 4% of their total initial investment per subscriber and cable companies 2.5% by jointly owning the cable sheath itself and sharing the costs *pro rata* based on the numbers of fibres owned by each. Further savings could be obtained if the cost of the support structure (poles and conduits), as well as the recurrent maintenance and repair costs, were taken into account. In addition, the joint planning and ownership of cable facilities raises the possibility that the total number of fibres required to meet the needs of both operators could be rationalized (less spare fibres required, as an example), resulting in further potential cost reductions.

Also in the case of a new build, it is anticipated that further savings could be achieved through the joint use of facilities closer to the subscriber such as the pedestals and a single sheath including both a coaxial cable and a copper pair for the subscriber drop. However, a more detailed study would be required to quantify these savings.

A portion of the above savings may be affected by the need for increased coordination between the joint owners and by potential engineering compromises required to implement a network suitable for both operators.

Transmission technologies do not yet support the efficient local network transport of unidirectional video and bi-directional telecom services via a single type of equipment. While technological convergence has been recognized for close to 20 years, and has been the subject of numerous studies and even field trials, it has been slow to materialize.

The synergy between fibre optics and digital video compression brings promises of an accelerated convergence at least at the feasibility level. However, the ubiquitous penetration of these technologies in local networks will require massive investments (figures as high US$310 billion to bring fibre to the home for 100 million cable television subscribers have been quoted[40]) with the probable consequence that it will be slow to come about. This fact alone militates in favour of a free market driven approach that will enable more than one network operator to test the viability of a number of technological and network implementation alternatives and provide the real conclusion as to the existence of, and potential for, efficient exploitation of technological convergence.

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[39] "The Videophone Goes Home Computer", *Byte*, April 92, p. 51.

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[40] B.L. Egan, *Information Superhighways: The Economics of Advanced Communications Networks* (Artech House), 1991, p. 118.

ANNEX A
COST DETAILS FOR TELEPHONY CONFIGURATIONS

A.1 Downtown Business Office

Capital investments	($ per line)
- CO Terminal	200
- Cable[1]	200
- CLE	400
- Riser Cable	100
Total	$900 per line

[1] Based on distance of 1.5 kilometres from the CO and a 96-fibre cable installed

A.2 Industrial Park Application

Capital investments	($ per line)
- CO Terminal	200
- Feeder Cable[2]	850 (10 kilometres)
- DLC in Cabinet	400
- Distribution Loops[2]	400
Total	$1,850 per line

[1] Feeder length assumed to be 10 kilometres and loop length assumed to be 3 kilometres

A.3 Residential Urban and Suburban Applications

- Capital investments ($ per line)

Capital investments	($ per line)
- CO Terminal	200
- Cable[3]	225
- DLC in OP Cabinet	400
- Distribution Loops	400
Total	$1,225 per line

[1] 5-kilometre feeder length assumed and a 48-fibre cable installed

A.4 Residential Rural

- Capital investments ($ per line)

Capital investments	($ per line)
- Cable[4]	3,000
- Jumper Wire Interface	10
- Distribution Loops	500
Total	$3,510 per line

[2] Feeder length assumed to be 15 kilometres and consisting of a 100-pair copper cable

ANNEX B
COST DETAILS FOR CABLE TELEVISION CONFIGURATIONS

B.1 Coaxial Tree-and-Branch Configuration

As reported by David P. Reed, *Residential Fibre Optic Network*, Artech House 1991, p. 316.

- 25,600 subscribers served
- $500 per subscriber

B.2 Hybrid Fibre/Coaxial Cable Architecture

As reported by David P. Reed, *Residential Fibre Optic Network*, Artech House 1991, p. 318.

- 25,600 subscribers served
- $450 per subscriber

ANNEX C
DETAILS OF THE CALCULATION OF COST SAVINGS

C.1 Two Cable Analysis

5 kilometres in distance covered:

48-fibre feeder cable for the telephone company
24-fibre trunk cable for the cable company

Cost:	Material:	48-fibre cable:	$16.61/metre
		24-fibre cable:	$ 9.60/metre
	Installation:	48-fibre cable:	$6.00/metre
		24-fibre cable:	$5.50/metre

Total cost:	Telephone Company:	$115,000
	Cable Company:	$ 76,000
Total:	$191,000 or approx.	$200,000

C.2 One Cable Analysis

One 72-fibre cable installed

Cost:	Material:	$25.00/metre
	Installation:	$ 6.00/metre

Total of $155,000 i.e. a saving of $36,000 or 18.8% vs $191,000 for two cables

C.3 Pro-Rata Cost Savings

$36,000 combined ($24,000 to the telephone company and $12,000 to the cable company)

- $24,000/500 subscribers = $48 per subscriber
i.e. ≈ 4% of total investment estimated at $1225 per subscriber for the telephone company (as per Annex A, A.3)

- $12,000/1024 subscribers = $12 per subscriber
i.e. ≈ 2.5% of total investment estimated at $500 per subscriber for the cable company (as per Annex B, B.1)

APPENDIX C

THE POLICY AND REGULATORY CONTEXT

APPENDIX C

THE POLICY AND REGULATORY CONTEXT

1.0 POLICY AND REGULATION OF TELEPHONE COMPANIES IN CANADA

1.1 A Brief History of Telephone Regulation in Canada

Most telephone companies in Canada are regulated by the Canadian Radio-television and Telecommunications Commission (CRTC), a federal regulatory board which also regulates broadcasting undertakings.

The roots of the Commission's jurisdiction can be traced to the 1880s, and the regulation of the first telegraph and telephone companies in Canada. The Bell Telephone Company of Canada was incorporated by Act of Parliament in 1880. The *Bell Canada Special Act*[1] was amended in 1892 to prohibit the company from implementing a rate increase without the approval of the federal Cabinet and again in 1902 to give the Cabinet the further power to increase or decrease Bell's telephone rates on the application of the company or any municipality.

In 1906, the federal government amended the *Railway Act*[2] to extend the jurisdiction of the Board of Railway Commissioners for Canada to the regulation of telephone rates of all telephone companies within Parliament's jurisdiction, including Bell. The *Railway Act* was further amended in 1908 to extend the Board's jurisdiction to telegraph rates and to apply the Act's provisions requiring rates to be reasonable and prohibiting unjust preference or discrimination by telephone and telegraph companies. The Act was completely reconsolidated and renumbered in 1919, and the 1919 wording remains the base for most of the legislative provisions currently being applied to federally-regulated telephone companies.

The Board of Railway Commissioners for Canada was supplanted in 1938 by the Board of Transport Commissioners for Canada, which was itself supplanted by the Canadian Transport Commission (CTC) in 1967. In the same year the provisions relating to the structure and powers of the CTC were moved from the *Railway Act* to the *National Transportation Act*.[3] On April 1, 1976, jurisdiction over federal telephone and telegraph companies was transferred from the CTC to the Canadian Radio-television and Telecommunications Commission, the expanded successor to the Canadian Radio-Television Commission. The powers and procedures of the CRTC relating to telecommunications contained in the *National Transportation Act* were retained when the CTC was reorganized and renamed the National Transportation Agency in 1987; they are now found in the *National Telecommunications Powers and Procedures Act* (NTPPA).[4]

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[1] S.C. 1880, c. 67; as amended or supplemented by S.C. 1882, c. 95; S.C. 1884, c. 88; S.C. 1892, c. 67; S.C. 1902, c. 41; S.C. 1906, c. 61; S.C. 1920, c. 100; S.C. 1929, c. 93; S.C. 1948, c. 81; S.C. 1957-58, c. 39; S.C. 1964-65, c. 69; S.C. 1967-68, c. 48; and S.C. 1977-78, c. 44, repealed and replaced by the *Bell Canada Act*, S.C. 1987.

[2] R.S.C. 1985, c. R-3, as amended.

[3] R.S.C. 1970, c. N-17, as amended.

1.2 The Extent of Federal Jurisdiction

There remain some exceptions to the rule that regulation of telecommunications is a federal responsibility in Canada. The CRTC currently regulates all but two of the major provincial telephone companies.

SaskTel and the Manitoba Telephone System (MTS), which serve Saskatchewan and Manitoba respectively, represent the first major exception. These two companies are provincial Crown corporations and are not bound by the *Railway Act* or *NTPPA*.

Until 1989, a number of other major regional telephone companies were still being regulated at the provincial level: Alberta Government Telephones (AGT), The New Brunswick Telephone Company, Maritime Telephone and Telegraph Co. in Nova Scotia, The Island Telephone Company serving Prince Edward Island and Newfoundland Telephone Co. all answered to public utilities boards in their respective provinces. In August 1989, the Supreme Court of Canada ruled that in *Alberta Government Telephones v. Canadian Radio-television and Telecommunications Commission and CNCP et al*[5] companies operating as these do fall under federal jurisdiction. The investor-owned companies, that is all but AGT, SaskTel and MTS, filed their tariffs for the approval of the CRTC within a few months of the Supreme Court's decision. AGT Ltd. was privatized in 1990, and came under the CRTC's jurisdiction on October 4, 1990.

The Manitoba government announced in late January 1991 that it had reached an agreement with the federal Minister of Communications as to the conditions that would govern the transition of MTS to CRTC regulation. The transitional period would begin when federal legislation was passed bringing the provincial Crown corporations under federal regulation. Such legislative provisions were tabled in the House of Commons as part of *Bill C-62*,[6] and received first reading on February 27, 1992. The Saskatchewan government has not yet reached a similar agreement with the federal government, and is opposing passage of *Bill C-62*. SaskTel is not presently regulated, and has not been subject to the supervision of an independent regulatory agency since the Saskatchewan Public Utilities Review Commission was abolished by the Saskatchewan government in 1987.

There is a second major exception to CRTC jurisdiction over Canadian telecommunications companies. A large number of small local telephone companies, most of them in Ontario and

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[4] R.S.C. 1985, c. N-20, as amended by 1987, c. 34, ss. 301-309, proclaimed in force, Jan. 1, 1988.

[5] [1989] 2 S.C.R. 225.

[6] *An Act respecting telecommunications*, 3rd Session, 34th Parliament, 40-41 Elizabeth II, 1991-92, first reading February 27, 1992.

Quebec, are regulated at the provincial or municipal level. These "independent" companies are sometimes owned and operated by the municipality in which they offer services, as in Prince Rupert, British Columbia; Edmonton, Alberta; and Thunder Bay and Kenora, Ontario, others are investor-owned or subscriber-owned. There are two independent regional companies operating in Quebec, each with a relatively small number of subscribers but a large service area: Québec-Téléphone and Télébec.

The Supreme Court's decision in *AGT v. CNCP et al*, was not explicit about whether the independent companies fell under federal or provincial jurisdiction. A challenge to the jurisdiction of the Quebec regulator, the Régie des Télécommunications, is currently before the Quebec Court of Appeal; this case could result in a judicial determination that these independent telephone companies fall within either federal or provincial jurisdiction. *Bill C-62* has been framed widely enough to apply to any Canadian carriers that are found by the courts to operate within federal jurisdiction.

1.3 Regulatory Methodology for Telecommunications

1.3.1 Present Methodology: Rate Base/Rate of Return Regulation

The CRTC's basic statutory mandate with respect to the telephone companies it regulates has remained essentially unchanged since 1906. It is to ensure that the rates these companies charge are reasonable and that they offer their services without unjust discrimination. Under the *Railway Act*, these objectives are expressed as follows:

> 340. (1) All tolls shall be just and reasonable and shall always, under substantially similar circumstances and conditions with respect to all traffic of the same description carried over the same route, be charged equally to all persons at the same rate.
>
> (2) A company shall not, in respect of tolls or any services or facilities provided by the company as a telegraph or telephone company,
>
>> (a) make any unjust discrimination against any person or company,
>>
>> (b) make or give any undue or unreasonable preference or advantage to or in favour of any particular person or company or any particular description of traffic, in any respect whatever, or
>>
>> (c) subject any particular person or company or any particular description of traffic to any undue or unreasonable prejudice or disadvantage, in any respect whatever, and where it is shown that the company makes any discrimination or gives any preference or advantage, the burden of proving that the discrimination is not unjust or that the preference is not undue or unreasonable lies on the company.

The Commission has required that all tolls, or rates be filed by each telephone company subject to the provisions of the *Railway Act*, in the form of a tariff for its approval. The CRTC has used a rate base/rate of return (RB/ROR) approach to determining that, at an aggregate level, the rates of a telephone company are just and reasonable. In this respect, the Commission's practice is similar to the traditional approach taken by its predecessor, the CTC, and nearly every other utility regulator in Canada and the United States until the mid- or late 1980s.

RB/ROR regulation is based on the premise that a regulated company is entitled to have rates set at a level which will cover its overall cost of service, called its "revenue requirement". The revenue requirement is determined by calculating the total of the company's expenses, including taxes, plus a fair rate of return on its rate base. The rate base consists of the fair value of the assets or investment the company uses to provide its regulated services. Allowable return on debt financing is generally calculated as estimated actual interest expenses for embedded debt. With respect to equity, the regulator generally prescribes a rate of return at a level necessary to attract capital to investments having the same degree of risk as the regulated company.

Once the revenue requirement has been determined, it is translated into a rate structure through which different rates are set for the different types of services the company provides. The rate structure will often seek to accomplish other objectives, in addition to the recovery of the company's revenue requirement, such as ensuring that there is no unjust discrimination between types of customers or services. As well, the CRTC has traditionally sought to accomplish other goals through its rate regulation of the telephone companies, such as maintaining affordable and universal service, encouraging efficiency in pricing, and permitting a regulated company to maintain and improve the quality of the services it provides.

1.3.2 CRTC Procedures Relating to Local Networks

Several of the specific tools the Commission has developed to assess whether rates are reasonable are particularly relevant to considerations of telephone company investment in local network infrastructure. Two of these, the Construction Program Review Process, and the Telecommunications Cost Inquiry, are discussed in the following sections.

1.3.2.1 The Construction Program Review

Since 1981, the Commission has conducted its review of the capital expenditures plans of the telephone companies separate from its general revenue requirement proceedings.[7] The CRTC has set up a less formal process, including review meetings, which was designed to generate information that can be used to assess whether the company's capital program for any year is reasonable. The review meetings are generally presided over by a CRTC staff member, appointed pursuant to the NTPPA, subsection 84(1). Intervenors at review meetings are invited to raise any issues that could assist the Commission in making a determination as to whether parts or the whole of the capital plan are reasonable. Since capital expenditures will accrue to the rate base, it is important to assess whether the company's plans will unduly inflate the rate base of its regulated activities.

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[7] See for example, Telecom Public Notice CRTC 1982-6, *Bell Canada - 1982 Construction Program Review*, 7 C.R.T. Part 2, January 28, 1982, p. 97.

In recent years, a major issue examined almost exclusively in the context of construction program review meetings has been the proposed deployment by the telephone companies of fibre optic technology, particularly in the local, or access, network. Two main issues have arisen in this context. First, can the telephone company justify its deployment of fibre optic facilities on the basis of present demand, or is it over-investing in this technology to ensure that it is in a more favourable position to offer services that might be competitive with other telecommunications facility-owners (such as cable operators)? Second, is the telephone company properly allocating the cost of deploying fibre between competitive services and basic monopoly access service?

Through the Construction Program Review, the CRTC has assessed the extent to which fibre optic technology is being deployed by the telephone companies and whether it is reasonable. So far, the Commission has generally found that this aspect of the capital plans of the telephone companies is reasonable.

1.3.2.2 The Telecommunications Cost Inquiry

Costing information can be relevant in determining at least two important regulatory issues. First, having regard to the cost of providing the service, is the price charged for a particular service or group of services higher than it should be? And second, are the prices being charged for some services, particularly those offered on a competitive basis, too low to cover their associated costs, suggesting that the carrier is cross-subsidizing competitive activity using monopoly revenue?

The CRTC has developed a number of related costing methods which it uses to assess whether proposed rates are reasonable. The Telecommunications Cost Inquiry, conducted from the mid-1970s through the late 1980s, has had three phases. In Phase I,[8] the Commission examined various accounting and financial issues including depreciation and valuation of the rate base, and determined that for the telephone companies it regulates, it would employ an average invested capital rate base, rather than a type of asset rate base methodology commonly used by other North American regulators.

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[8] Telecom Decision CRTC 78-1, *Inquiry into Telecommunications Carriers' Costing and Accounting Procedures, Phase I: Accounting and Financial Matters*, 3 C.R.T. Part 1, January 13, 1978, p. 524, (see also, Telecom Decision CRTC 79-9, Inquiry into Telecommunications Carriers' Costing and Accounting Procedure, Phase I: Accounting and Financial Matters (Revision to Certain Directives contained in Telecom. Decision CRTC 78-1), 5 C.R.T. Part 1, May 8, 1990, p. 80).

Phase II[9] considered the costing of new services and adopted an incremental cost approach to matching the projected costs and revenues of such services. Generally, the Phase II rules require that a telephone company proposing to initiate a service provide an economic evaluation of the service demonstrating that it has a positive net present value. In other words, there must be sufficient revenue associated with the service over a multi-year period to at least meet the costs of providing the service. These costs were to be identified under four categories: direct, indirect, variable common and fixed common. The first three categories made up the incremental costs of the new service.

In Phase III, the Commission turned its attention to identifying the costs of broad categories of existing services. It established the conceptual framework for its methodology in Telecom Decision CRTC 85-10[10]. The methodology assigns costs among prescribed broad categories of services based on the principle of cost causation, it does not attempt to allocate non-causal or common costs. The categories eventually established under the Phase III process were: access services and facilities; monopoly local; monopoly toll; competitive network; competitive terminal -- multiline and data; competitive terminal — other; common; and other.

The Commission recognized that all costs could not, and should not, be fully allocated among categories of service. The Common category was to include overhead and administrative costs that were not causally related to the output levels of other categories. Access was to include the costs, and any revenues associated with the provision of subscriber lines (loops) as well as other facilities required to connect customers with the carrier's local, toll or long distance, and competitive networks. These costs could not be causally linked to changing output levels. Access category costs in excess of revenues were to be recovered through contributions from other categories, although the possibility of creating separate access tariffs at some point in the future was recognized.

Carriers subject to the Phase III methodology, originally only Bell Canada and B.C. Tel, were required to file Phase III manuals documenting the procedures each would use to assign revenues and costs among the eight broad service categories. Each company was also required to submit revenue and cost results annually. These annual reports are scrutinized by the Commission and other interested parties. The Phase III process was meant to address the concern that carriers operating in both monopoly and competitive markets might set prices for their competitive services below cost, to the detriment of both their monopoly subscribers and their competitors.

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[9] Telecom Decision CRTC 79-16, *Inquiry into Telecommunications Carriers' Costing and Accounting Procedures - Phase II: Information Requirements for New Service Tariff Filings*, 5 C.R.T. Part 1, August 28, 1979, p. 528.

[10] *Inquiry into Telecommunications Carriers' Costing and Accounting Procedures - Phase III: Costing of Existing Services*, 11 C.R.T. Part 1, June 25, 1985, p. 628.

The Commission is now engaged in the process of adapting the Cost Inquiry methodology to telecommunications carriers other than Bell and B.C. Tel, including the telephone companies that had been regulated at the provincial level before 1989.

1.3.3 Criticisms of Rate Base/Rate of Return Methodology

Although the basic regulatory methodology used by the CRTC is also used by many other regulatory authorities in North America and its use has received the approval of Canadian courts, it has been the subject of an increasing amount of criticism in recent years. The criticism centres on the concern that RB/ROR regulation does not provide sufficient incentives for regulated firms to act efficiently in incurring capital costs and other expenditures. On the contrary, it is argued that an RB/ROR regulated firm would often have an incentive to increase its investment or rate base since it is entitled to recover all costs associated with the larger rate base and be allowed a larger financial return.

Since RB/ROR regulation constrains profits, some also argue that this method acts as a disincentive for regulated firms to innovate and take risks. If the company loses money on a risky new venture, it may not be able to recover its investment by raising rates on the new services or on existing lines of business. If it succeeds, it may not be able to profit fully, since it will not be permitted to earn a rate of return above the maximum set by the regulator.

RB/ROR regulation is relatively costly and time-consuming, both for the regulator and the regulated company. This cost is then generally passed on to the subscribers. The Commission has increasingly indicated that it is open to reducing the burden of requiring tariffs to be filed in respect of various types of services, recognizing that the existing level of detail in regulation is not required in all circumstances to ensure that rates remain just and reasonable.

1.3.4 Other Possible Regulatory Methodologies

1.3.4.1 Incentive Regulation

A variant on traditional RB/ROR regulation, which is increasingly common in U.S. state jurisdictions, permits a regulated firm to keep some proportion of profits it earns above its specified rate of return, provided there is some protection for the subscriber against excessive rate increases, such as a price cap (see below). In theory, the opportunity to retain earnings above what was foreseen when the ROR was set gives the company an incentive to increase productivity and take the risk of offering more innovative services. This type of incentive regulation still depends on an assessment of the rate base and the projected or historical cost of providing service. If the regulator accepts an inflated cost estimate, excess profits can be achieved even within the allowable range of return simply by keeping costs to non-inflated levels.

1.3.4.2 Price Caps Schemes

As the name suggests, price caps schemes concentrate on constraining the prices charged for services rather than the profits earned by a regulated firm. The regulator will establish a maximum rate for price increases for specific types of service. In the U.K., such a method was adopted to regulate British Telecom's prices following privatization of the company. Price increases for British Telecom's business and residential line rentals and direct-dialled inland calls were limited during the first five years after privatization to the Retail Price Index, similar to Canada's Consumer Price Index, less a productivity factor of 3%. After 5 years, the productivity factor was increased to 4.5%, and specific caps were set on local business and residential line rates. The productivity factor has subsequently been increased again.

The U.S. Federal Communications Commission has also adopted a price caps scheme. In each of three "baskets" of services (residential and small business services, "800" services and all other business services), actual proposed rates aggregated across all the services in the basket are measured against aggregated and weighted rates during a base year. If the difference exceeds the regulatory price cap index, calculated by adding the inflation rate and subtracting a productivity offset, a more onerous review procedure will be applied to the carrier.

There are a number of difficulties with price caps schemes. First, base rates must be established with some accuracy or else unduly high or low rates will be incorporated into the rate structure for future years. Second, the regulator must arrive at a price caps formula, which in the applications essayed to date has meant choosing an appropriate measure for inflation, then assigning a productivity offset. Both parts are difficult, especially determining what a fair amount would be to ascribe to productivity. Third, there are concerns that the incentive to implement productivity improvements decreases as the company nears the end of a review period; it is theorized that it would be better for the company to keep the base rates higher for the next period, than to take advantage of the productivity increase.

1.3.4.3 Social Contract Regulation

Another approach that departs from the regulator's traditional RB/ROR approach, establishes a contract between regulator and regulated firm. Under such a contract, the firm agrees to behave in a particular way or within certain limits related, for example, to service or infrastructure improvement and rate increases, and the regulator agrees that as long as the firm behaves as prescribed, it will not impose additional regulatory measures. Social contracts have not been widely experimented within North America.

2. POLICY AND REGULATION APPLYING TO CABLE OPERATORS

2.1 A Brief History of the Regulation of Cable Television in Canada

2.1.1 CRTC Jurisdiction and Regulatory Approach

The CRTC's jurisdiction over cable television operators dates back to the creation of the Commission in 1968. The Canadian Radio-Television Commission inherited the powers assigned to the Board of Broadcast Governors in 1958, to regulate advertising and program content on private radio and television stations and advise the Minister of Transport on applications for new or amended broadcasting licences. When the new 1968 *Broadcasting Act*[11] created the CRTC, the Act invested it with the authority to license and regulate the operators of broadcasting undertakings, including broadcasting receiving undertakings. This encompassed the 300 or so cable television systems then operating in Canada.

Since 1968, the key to the CRTC's regulatory approach, and the objectives of its policies for cable, have been to ensure the smooth integration of cable into the Canadian broadcasting system with a view to expanding viewer choice while maintaining the viability of local broadcast licensees and encouraging contribution to Canadian program production. At first, the Commission viewed cable television as a threat to the survival of Canadian over-the-air broadcast licensees. The CRTC noted in a February 1971 policy statement that "unlimited penetration by United States stations on a wholesale south to north basis would completely destroy the licensing logic of the Canadian broadcasting system" and pose financial peril for Canadian licensees.

By the 1980s, cable television was recognized by the Commission as a mature industry and the means by which most Canadians gained access to Canadian and foreign programming sources. By then Canadian pay and specialty services were being carried on cable and their viability was of considerable concern to the CRTC. Cable's role in extending programming services to remote and underserved parts of Canada was formally recognized in the Commission's response to the 1985 report of the Task Force on Access to Television in Underserved Communities (the Klingle report).[12]

2.1.2 Earliest Regulatory Mechanisms

It was not until November 1975 that the Commission established the first regulations for cable TV. Until that time, the Commission had relied on the use of conditions of licence and policy announcements to supervise the cable industry.

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[11] R.S.C. 1985, c. B-9.

[12] Public Notice CRTC 1985-61, *Distant Canadian Television Signals*, March 22, 1985.

The Commission published its first comprehensive policy statement on July 16, 1971.[13] In the statement, the Commission addressed carriage of signals, ruling on the priority to be accorded certain local and regional signals and the allowable number of non-Canadian stations that could be carried on any system as well as the desirability of providing a non-commercial local programming "community" channel. The CRTC also adopted a policy of permitting a higher priority television station to require the local cable operator to substitute its programs and commercials for identical programs from a station with lower carriage priority, which evolved over time to the present "simultaneous substitution" rules.

2.1.3 The *Cable Television Regulations, 1975*

In preparation for a public hearing on proposed cable television regulations that was to be held in April 1975, the CRTC published a number of policy documents and outlined the proposed regulations. The first regulations for cable television were published in November 1975, and the policy issues noted above were all addressed in a public announcement on December 16, 1975 entitled *Policies Respecting Broadcasting Receiving Undertakings (Cable Television)*.

The November 1975 Regulations:

- defined classes of licence (class "A" being undertakings with more than 3,000 subscribers and class "B" those with fewer than 3,000);
- established radio and TV service priorities, which essentially put into the regulations the priority carriage requirements that the CRTC had established by policy;
- formally established by regulation the allocation of frequencies according to priority;
- required cable systems to reserve a channel for an educational broadcasting service;
- required cable systems to provide a community channel.

The regulations formalized some of the earlier policies of the Commission, but they left many areas of cable activity which the Commission continued to regulate by policy imposed by conditions of licence and by requiring pre-authorization for such matters as the addition of services and rate increases.

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[13] *Canadian Broadcasting "A Single System" — Policy Statement on Cable Television* (Ottawa: Canadian Radio-Television Commission, 1971).

In *Policies Respecting Broadcasting Receiving Undertakings (Cable Television)*, the CRTC outlined its policies on five aspects of cable television: the community channel; carriage of radio services; converter service; supplementary programming channels; and pay-television. The CRTC indicated that the 1975 policies were meant to "supplement" and "extend" the Cable TV Regulations published a month earlier.

The next major policy statement on cable television came in 1979. In *A Review of Certain Cable Television Programming Issues*,[14] the CRTC addressed its rules concerning simultaneous substitution, carriage of U.S. network signals and distant Canadian signals, carriage of Canadian radio signals on the audio service, advertising on the community channel and sharing the community channel with special programming services under specified conditions.

2.2 Current Regulatory Structure for Cable Television

In 1986, new cable television regulations were promulgated by the CRTC, and in 1987, several new Canadian specialty and pay-television services were licensed. These developments are the key components of the present framework of CRTC regulation of cable operators.

2.2.1 The *Cable Television Regulations, 1986*

The *Cable Television Regulations, 1986*[15] ushered in an era of more streamlined cable regulation and for the first time provided a different, far lighter-handed regulatory approach for small systems.

Perhaps the most significant change brought about by the new regulations was the partial deregulation of rate-setting. One of the CRTC's primary objectives in revising the cable regulations was to reduce the amount of regulatory burden on cable systems (and thereby reduce the Commission's own workload). Much of the CRTC's regulatory work in cable involved processing hundreds of rate increase applications.

Thus, with respect to rate-setting, the 1986 regulations:

- allowed for an automatic basic rate increase up to 80% of the Consumer Price Index (CPI);
- permitted automatic pass-through of cost increases associated with carrying new programming services as well as for microwave, pole and conduit use;

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[14] CRTC Telecom Public Announcement, 4 C.R.T. Part 2, March 26, 1979, p. 890.

[15] "Broadcasting Act - Cable Television Regulations, 1986", *Canada Gazette Part II, Vol. 120, No. 17* (SOR/86-831, August 1, 1986).

- permitted cable systems to increase the basic rate by 10% of the annual cost of capital expenditures (CAPEX) distributed over the subscriber base; and
- required prior CRTC approval for rate increases not otherwise automatically permitted by the regulations.

The CAPEX increase was introduced to provide an incentive to cable systems to upgrade their carriage capabilities so that they would be able to distribute as many services as possible.

Other highlights of the new regulations were:

- for the first time, cable company ownership of head end, amplifiers, and subscriber drops was required by regulation rather than condition of licence;
- the requirement in the regulations that a majority of programming services carried on any system must be Canadian;
- mandatory audio carriage was extended to local AM radio services in addition to local FM signals;
- carriage of non-programming services was generally not subject to the regulations;
- to permit carriage of an expanded range of programming services automatically, rather than on the basis of prior approval for each service;
- limited advertising was permitted on the community channel;
- carriage of U.S. superstations was permitted on systems serving underserved areas;
- tiering and linkage requirements were adopted formally as regulations (see section 2.2.3 below for a description of tiering and linkage); and
- a scheme of minimal regulation was introduced for systems serving underserved areas.

Generally, the new regulations recognized the increasing availability of new conventional and satellite programming services, recognized the emergence of non-programming services, and reflected an intent to require greater industry self-regulation. They were to allow for more flexibility and increased revenue-earning power to cable operators enabling them to respond more ably and more immediately to competitive pressures.

The CRTC created new classes of licensees to implement its relaxed regulatory approach to systems serving underserved areas. Systems serving areas where there were two or fewer Canadian signals available off-air came to be governed by Part III of the regulations and became known as "Part III licensees". All other licensees were subject to the requirements contained in Part II of the regulations and were divided into Class 1 licensees (serving 6,000 subscribers or more) and Class 2 licensees (serving less than 6,000 subscribers).

However, some new restrictions were applied. For example, cable systems would not be permitted to carry any U.S. station received over-the-air that began operating on or later than January 1, 1985. This restriction was designed to offset the perceived threat to local broadcasters posed by (at the time) new border stations licensed by the FCC in the U.S, which were aimed primarily at the Canadian market.

Since 1987, there have been a number of amendments to the regulations. Some adjustment was made to rate regulation by way of a Public Notice issued by the Commission on May 15, 1990.[16] The allowable automatic CAPEX increase was limited to 3% and the automatic pass-through charges were restricted to those associated with carriage of programming services, and no longer included increased costs incurred by cable systems for microwave, pole or conduit use.

Other amendments included new, streamlined regulations regarding the community channel and the reduction of the bench-mark for determining profitability from a 24% to 23% rate of return on net fixed assets. As a separate matter, as a result of new legislation passed pursuant to the Canada - United States Free Trade Agreement, cable systems were required to pay copyright royalties for the retransmission of programming on distant stations beginning in January 1991. The CRTC subsequently indicated that it would not permit the automatic pass-through of these royalties in cable rates increases.[17]

2.2.2 The *Broadcasting Act* Proclaimed June 4, 1991

The new 1991 *Broadcasting Act*,[18] classifies cable television systems and similar operations as "distribution undertakings" as opposed to "broadcasting receiving undertakings" under the previous Act. Paragraph 3(*t*) of the new Act provides that distribution undertakings:

(i) should give priority to the carriage of Canadian programming services and, in particular, to the carriage of local Canadian stations;

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[16] Public Notice CRTC 1990-53, *Cable Television Regulations, 1986 - Changes to the Regulation of Subscriber Fees and Related Matters*, May 15, (1990 CRTC Broadcasting Decisions and Notices, Vol. 5, No. 91).

[17] *Ibid.*

[18] S.C. 1991, c. 11.

(ii) should provide efficient delivery of programming at affordable rates, using the most effective technologies available at reasonable cost;

(iii) should, where programming services are supplied to them by broadcasting undertakings pursuant to contractual arrangements, provide reasonable terms for the carriage, packaging and retailing of those programming services; and

(iv) may, where the Commission considers it appropriate, originate programming, including local programming, on such terms as are conducive to the achievement of the broadcasting policy set out in this subsection, and in particular provide access for underserved linguistic and cultural minority communities.

In order to ensure that any contractual arrangements between common carriers and cable operators respect the objectives of the broadcasting policy for Canada contained in subsection 3(1) of the *Broadcasting Act*, particularly with respect to cable's ability to use the most cost-effective technology available, consequential amendments were made to the *Railway Act* (sections 335 and 340). Common carriers are now permitted to discriminate in favour of the delivery of programs in certain circumstances if the Commission finds that such discrimination or advantage furthers the broadcasting policy for Canada set out in the *Broadcasting Act*.

2.2.3 Tiering and Linkage Rules

The CRTC first licensed pay-television in Canada in 1982. Because of the new pay services, the emerging popularity of U.S. specialty satellite-to-cable services, and the incipient introduction of Canadian specialty programming channels, more attention was devoted to the packaging of services on various cable tiers. Thus, on October 26, 1983, the CRTC published the criteria by which Canadian pay-television services, U.S. specialty services, and eventually, Canadian specialty programming services, should be tiered on cable systems.[19] The Commission set out ground rules for those systems that packaged services in tiers.

These ground rules limited pay-television (and specialty services) to carriage on discretionary tiers, permitted no carriage of U.S. pay-television services but allowed carriage of U.S. duplicate signals or independent stations on discretionary tiers, and prohibited carriage of the Canadian "superstations" distributed over satellite by the newly licensed Canadian Satellite Communications Inc. (CANCOM) on systems other than those in CANCOM's core market (underserved areas). The CRTC also established that cable subscribers must first subscribe to basic service before they could receive discretionary services.

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[19] CRTC Broadcasting Public Notice 1983-245, *Cable Television Service Tiering and Universal Pay Television Service*, 9 C.R.T. Part 2, October 26, 1983, p. 116.

In a related notice,[20] the Commission scheduled a public hearing in January, 1984, to consider applications to provide Canadian specialty services. The CRTC announced that it would be prepared to authorize the carriage of certain U.S. specialty services on discretionary tiers once the Canadian services were licensed. The Commission also established several "linkage" requirements for the carriage of discretionary services.

These requirements established a limit of five U.S. specialty services to be selected from a CRTC-approved list of eligible services. Each foreign service was to be tiered with one or more Canadian pay-television or specialty services. The CRTC decided not to regulate the retail rate charged for discretionary services. Finally, the CRTC stated that as a general rule, there should be more Canadian services than foreign services on any cable system. The Commission indicated that these "tiering and linkage rules" would be reviewed in two years.

The CRTC refined its tiering and linkage requirements when it licensed two new Canadian specialty channels, Much Music[21] and what became known as The Sports Network, in the spring of 1984. It maintained the limit of five U.S. specialty services per system and reiterated, this time "as a matter of policy", that there should be more Canadian than foreign programming services on any given system. It revised the tiering and linkage rules to permit a Canadian pay-television service to be tiered with up to five U.S. specialty services, and permitted a Canadian specialty service to be tiered with up to two U.S. specialty services on a single tier. The CRTC also prohibited cable systems from offering tiers containing only U.S. signals.

The CRTC licensed several new Canadian pay-television and specialty services on November 30, 1987.[22] Adjustments were made to the cable regulations concerning tiering and linkage[23] to accommodate three changes: First, Much Music and The Sports Network were now permitted to be carried on the basic service, and were no longer exclusively discretionary. Second, all the new specialty services were licensed to be carried on the basic service at the option of the cable operator. Finally, cable systems serving francophone communities were required to distribute all available French-language services if they opted to carry any one of them (the one-for-all stipulation). The regulations were also amended to reflect minor adjustments to the rates chargeable for specialty services.[24]

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[20] CRTC Broadcasting Public Notice 1983-244, *Public Hearing on Canadian Specialty Programming Services — Introduction of Foreign Specialty Programming Services*, 9 C.R.T. Part 2, October 26, 1983, p. 113.

[21] Decision CRTC 84-338, *Applications for a Network Licence to Distribute a Canadian Music Specialty Programming Service — CHUM Limited — Rogers Radio Broadcasting Limited — CMTV Canadian Music Television Ltd.*, 10 C.R.T. Part 1, April 2, 1984, p. 1.

[22] Public Notice CRTC 1987-260, *Introductory Statement to Decision CRTC 87-895 to 87-906: Canadian Specialty and Pay Television Services*, November 30, 1987 (CRTC Broadcasting Decisions and Notices, Vol. 3, No. 50).

[23] Public Notice CRTC 1987-261, *Distribution and Linkage Requirements*, November 30, 1987 (CRTC Broadcasting Decisions and Notices, Vol. 3, No. 50).

2.2.4 Community Channel Policy

The first reference to a community channel in CRTC regulatory documents relating to cable operators is found in the Commission's comprehensive cable policy statement of 1971. At that time, the Commission encouraged cable licensees to provide and produce local programming for a community channel, although such a channel was not required. Limited networking between cable systems was permitted in order that community programs could be distributed and shared. No advertising was permitted on the community channel.

The *Cable Television Regulations, 1975*[25] included a requirement to provide a community channel. In its subsequent policy statement of December, 1975,[26] the Commission issued a set of detailed expectations and criteria for the operation of the channel. While the CRTC did not impose a specific financial requirement, it did state its expectation that licensees would allocate "a reasonable percentage of gross subscriber revenue" for the channel, and suggested that 10% was a "useful standard of expenditure".

In June of 1991, the CRTC updated the policy for community channels that had been in effect for the previous 15 years. Generally, the Commission noted the success of the community channel program and encouraged cable licensees to continue to build upon its proven strengths and to further develop its potential. CRTC Public Notice 1991-53,[27] announcing the new policy, dealt mainly with the financial aspects of cable operations and the use of the community channel.

The Commission established a bench-mark that licensees must invest a minimum of 5% of basic service revenues in community programming. It also established a policy that no more than 40% of the community programming schedule of a licensee be devoted to non-local programs. However, the Commission excluded from the definition of non-local programs those programs produced by adjacent licensees in the same metropolitan area. This exclusion permitted licensees an added degree of flexibility.

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[24] Public Notice 1987-262, *Proposed Amendments to the Cable Television Regulations, 1986*, November 30, 1987 (CRTC Broadcasting Decisions and Notices, Vol. 3, No. 50).

[25] CRC 1978, c. 374.

[26] *Policies Respecting Broadcasting Receiving Undertakings (Cable Television)* (Ottawa: Canadian Radio-television and Telecommunications Commission, December 16, 1975).

[27] CRTC Public Notice 1991-53, *Proposed Amendments to the Radio Regulations, 1986; Television Broadcasting Regulations, 1987; Pay Television Regulations, 1990; and Specialty Services Regulations, 1990*, May 13, 1991 (CRTC Broadcasting Decisions and Notices, Vol. 6, No. 30).

As a further indication of the Commission's less onerous regulatory approach for smaller systems, it removed the requirement that Class 2 systems with fewer than 2,000 subscribers provide community programming on the community channel. However, if they did not, they were expected to provide a local alphanumeric service. These systems and all Part III licensees were also permitted to air up to 12 minutes of conventional local advertising material per hour on the channel, provided there was no local radio or TV broadcaster in the community served.

3.0 REGULATORY PROVISIONS RELATED TO ISSUES CONSIDERED BY THE LOCAL NETWORKS CONVERGENCE Committee

3.1 Ownership of Local Network Infrastructure

3.1.1 Cable Plant Ownership Regulation

Ownership of cable plant and equipment has been a concern for the Commission since 1970. The Commission's requirement that cable operators own head ends, amplifiers and subscriber drops was generally enforced by way of condition of licence before it was included in the 1986 regulations. This requirement was instituted in order to ensure compliance with federal broadcasting policy and regulation, and to ensure that cable operators were directly accountable to the public and the Commission for the provision of authorized services and rates charged. The CRTC felt that a cable company should not be in a position to avoid its responsibilities to either the public or to the Commission by claiming that it lacked effective control over its delivery system.

The requirement was incorporated into the *Cable Television Regulations, 1986*, as follows:

> Except as otherwise provided pursuant to a condition of its licence, a licensee shall own and operate its local head end, amplifiers and subscriber drops.

"Subscriber drop" was defined as follows:

> In these Regulations . . .
>
> "subscriber drop" means the equipment or facilities used by a licensee for the distribution of the programming services distributed on its basic band from the point at which these services are diverted from the distribution system to a television receiver, F.M. receiver, channel converter or other terminal device in a subscriber's household or premises for the exclusive benefit of that subscriber.

"Head end" was defined for the purposes of subsection 18(6), which provided for pass-through of capital expenditures:

> "head end" means the equipment and facilities used for the reception and processing of programming services that are distributed by a licensee.

The local head end of a cable system is defined in Section 2 of the regulations as follows:

> "local head end" means:
>
> the equipment and facilities at any specific location that are used for the reception and processing of programming services that are transmitted by local television stations or, if there are no such stations, by regional television stations, and that are distributed by the licensee, and for the processing of other services that are distributed by the licensee . . .

3.1.2 Exceptions to the Rule: Manitoba and Saskatchewan

In the 1970s, cable television systems were licensed in Manitoba and Saskatchewan with some modification of the plant ownership rules.

On November 10, 1976 the federal and Manitoba governments signed the Canada/Manitoba Agreement, whereby both governments agreed to new arrangements for the development of cable systems and services in Manitoba.

The Agreement recognized federal responsibility for the regulation and supervision of all broadcasting services distributed using the facilities of the Manitoba Telephone System (MTS). At the same time, it recognized the province's responsibility for the regulation of other telecommunications services distributed within the province by MTS. The Agreement centred on two main points: (1) the ownership of the coaxial cable and related equipment used to provide cable television services; and (2) the regulatory responsibility for these and other telecommunications services using MTS facilities.

The federal government agreed that cable systems could lease all facilities (including amplifiers and local drops) from MTS for distribution of cable television service to subscribers' homes, but ownership of the head end must remain with the cable company.

In December 1982, the Manitoba Government empowered the Manitoba Public Utilities Board (PUB) to adjudicate rate disputes between MTS and cable operators leasing MTS facilities.[28] The PUB was not granted the jurisdiction to approve rates contained in contracts between MTS and cable operators, only to adjudicate on disputes brought by the cable operators. Section 3(*d*) of the Order in Council included a requirement that revenues from MTS leases to cable operators should provide a financial contribution to other regulated MTS telecommunications services. The implied cross-subsidy (contribution) from cable leases to MTS' other services, together with the PUB's inability to establish contract rates, has been a major irritant for cable operators in Manitoba ever since.

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[28] Manitoba Order in Council 1470, December 15, 1982.

When cable television was introduced to Saskatchewan, the Commission signalled its intention to permit another exception to the cable plant ownership rules in that province. The Commission announced that it was "prepared to hear and give full consideration to all potential applicants regardless of the ownership arrangements they propose, in accordance with its usual hearing practices."[29]

3.1.3 CRTC Regulation of Telephone Companies Providing Support Structures

Bell Canada had applied in June, 1976, for approval of a new tariff offering, under which cable operators within Bell's territory could use Bell's support structures -- that is, poles and ducts -- in connection with their own coaxial cable. Until then, most cable licensees had entered into what Bell called "Partial System" arrangements, under which Bell itself owned the coaxial cable and leased it to the cable operator. As explained above, cable operators were generally required by regulation to own the head end, amplifiers and subscriber drops; however, Bell had also been offering a complete system arrangement under which all facilities were leased by Bell to the cable operator. The CRTC set the framework of its approach to the use made by cable television licensees of support structures owned and operated by the telephone companies within its regulatory purview.[30] The Commission made it clear that the "Complete System" arrangement, which was only rarely used in any case, should be phased out entirely.

A major issue of principle dealt with by the Commission in the context of this proceeding was its jurisdiction over contracts between telephone companies and cable operators. The CRTC concluded that while the full text of such contracts need not be set out in the tariff, "all the terms which describe the nature of the service or affect its value must be contained in the tariff, whether by reference or otherwise." In other words, the tariff, which must be publicly available, was to contain the significant terms of any agreement. In addition, the Commission required telephone companies to obtain CRTC approval in advance of the use of each proposed form of agreement.

In this context, the Commission also developed the so-called "Scope Clause". Bell had proposed a provision in its tariff which would leave the question of what use the cable operator might make of support structures leased from the company as a matter to be dealt with in a specific agreement:[31]

> Use of Support Structure by the lessee is to be effected only in pursuance of and upon the terms contained in an agreement in writing and entered into and executed by the Company and the lessee, which is to supplement and be governed by this tariff.

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[29] Public Notice 1976-132, *Applications for Cable Television Service to Certain Areas of Manitoba*, 2 C.R.T. Part 2, December 30, 1976, p. 657.

[30] Telecom Decision CRTC 77-6, *Bell Canada, Tariff for the Use of Support Structures by Cable Television Licensees*, 3 C.R.T. Part 1, May 27, 1977, p. 68.

[31] *Ibid.*

The Commission instead ordered the tariff to be amended to express the following principles, which would govern in the case of both partial system arrangements and the support structure tariff offering:

> 1. The offering is to be effected only in accordance with the terms contained in an agreement between the Company and the lessee, the form of which has been approved by the Commission.
>
> 2. The terms of the agreement are to be governed by the tariff, and in the event of any conflict or inconsistency the tariff is to govern.
>
> 3. There are to be no restrictions imposed by the Company on the services to be provided via the coaxial cable. In the Commission's view section 5 of the *Cable Television Regulations, 1975* should provide a sufficient regulatory basis for examining any questions raised as to the possibility of unfair competition.

It is the third clause that is usually referred to as the "Scope Clause". However, for cable operators, the fact that the Commission decided to exercise the degree of control it did over the terms negotiated between Bell Canada and themselves was seen as a potentially important source of protection from abuse by the telephone companies of their much stronger bargaining position.

Decision 77-6 also included some observations concerning potential competition between cable operators and telephone companies, and determined that the public interest required that the cable and telephone industry, and the electric utility industry, should co-operate in the joint use of support facilities, with the cable industry bearing a "fair share" of the costs of the facilities. The Commission did not resolve the question of the methodology to be used in setting rates for support structure offerings (SSO).

In the wake of Phases II and III of the Cost Inquiry (see above, section 1.2.2.2), the Commission returned to this question in 1985-86. In Telecom Decision CRTC 86-16,[32] the CRTC determined that the following principles would apply to the costing and rating of SSO and partial service arrangement services. First, the rates must recover at least the incremental costs attributable to the service. Incremental costs were to be calculated consistent with the Phase II methodology for costing new telecommunications services. Second, the rate should include a contribution to the recovery of fixed structure costs. These costs were to be computed on an embedded basis. A formula was established to calculate the maximum allowable contribution, based on usage of the structures. Third, the carriers were permitted to use a tiered rate structure where necessary.

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[32] *See Support Structures and Related Items — Public Proceeding on Rates*, August 15, 1986. [For related documents see: CRTC Telecom Public Notices 1985-12, 1985-44 and 1985-64.]

The telephone companies affected by the decision -- Bell, B.C. Tel and Terra Nova Tel -- were directed to file proposed tariffs and supporting cost studies for the SSO and partial service arrangement services they offered. Decision 86-16 continues to govern Bell and B.C. Tel. Of the five other telephone companies that have come under CRTC jurisdiction since the Supreme Court's 1989 decision in *AGT v. CNCP et al* (see above, section 1.2), only Newfoundland Telephone Co. has had its support structure tariff approved by the Commission to date.

3.1.4 Other Issues Concerning Cable Operators' Use of Telephone Company Support Structures

The CRTC recognized in Decision 86-16 that it did not have jurisdiction over electric utilities, and so could not regulate rates charged for use of their support structures. In practice, most telephone companies have joint use agreements with the power utilities, so cable operators have access to power utility poles through the telephone company tariffs.

There are contractual limitations on use of telephone company facilities. Although the general rule expressed by the "Scope Clause" applies where the CRTC regulates, there are examples of telephone companies limiting the use that can be made of their facilities by cable operators. In Saskatchewan, for example, the cable operators are permitted to install fibre optic cable only in major trunk circuits, not in the local distribution network. Similar restrictions existed in the City of Edmonton until the expiry in 1991 of the cable distribution agreement.

3.2 Development of Technical Standards

3.2.1 Development of Technical Standards in Telecommunications

Several Committees in Canada are charged with responsibilities for developing and implementing standards for the interconnection of telecommunications networks and equipment.

Standards for the interconnection of networks have generally evolved within the structure of the coalition of major telephone companies in Canada. This group was originally known as the Trans-Canada Telephone System (TCTS), was renamed Telecom Canada in the early 1980s, and was reorganized and renamed in late January, 1992. The Stentor organization, as it is now known, comprises three organizations: Stentor Telecom Policy Inc., which is in charge of policy development and government relations; Stentor Resource Centre Inc., with responsibilities for marketing and product development; and Stentor Canadian Network Management, an unincorporated organization which has taken over most of the functions of the old Telecom Canada with respect to interconnection of telephone company networks and revenue settlement. Responsibility for standards activities appears to rest with Stentor Resource Centre Inc. following the reorganization.

One aspect of Unitel Communications Inc.'s 1990 application to the CRTC for interconnection with Bell, B.C. Tel and the four Atlantic telephone companies[33] was a recognition that Unitel would have to become more closely involved in the process of adopting standards for network interconnection if its application was to be approved. Business telecommunications customers and competitive equipment manufacturers were concerned to ensure that Unitel's entry would result in network standards being discussed and adopted in a more open forum, permitting user involvement at some planning stages.

For some time now, the development of standards governing the attachment of terminal equipment to the telephone companies' networks has evolved as part of a more public process. In 1977, the Department of Communications (DOC) initiated the Terminal Attachment Program Advisory Committee (TAPAC) to afford provincial governments, telephone companies, manufacturers, suppliers and users an opportunity to participate in the development of standards for terminal attachment. TAPAC is chaired by the DOC and participation in its activities is voluntary. When TAPAC reaches consensus on a standard, it refers its decisions to the Department, which publishes the standard in the *Canada Gazette* for public comment then issues the standard. The focus of TAPAC's work is to ensure that there is no harm to the network resulting from the attachment of customer-owned terminal equipment. TAPAC-developed standards are mandatory.

Standards-writing activity is also undertaken by the Canadian Standards Association (CSA), which has two Committees operating in the area of computers and communications: the Steering Committee on Information Technology, or SCIT, and the Steering Committee on Telecommunications, or SCOT. Members on these Committees include representatives of the telephone companies, manufacturers and interested government agencies such as the DOC and CRTC. In addition, business users of telecommunications have input into the deliberations of the CSA Committees, either as individual companies or through membership in associations such as the Canadian Business Telecommunications Alliance, or both.

Formed in 1983 to assume the standards development functions of TAPAC, SCOT examines standards developed by such international bodies as the International Telecommunications Union's International Telegraph and Telephone Consultative Committee (CCITT) and the American National Standards Institute. SCOT considers whether any modifications might be useful or necessary to permit adoption of the international standards in Canada. SCOT can also develop uniquely Canadian standards. SCOT has recently begun to step up its activity with respect to developing standards for the interconnection of networks, recognizing that there is a need for network to network interoperability standards. This is driven by the implementation of Common Channel Signalling System 7 (CCS 7). Standards developed by CSA/SCOT are voluntary performance-related standards, not standards that are mandatory to obtain interconnection.

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[33] Telecom Public Notice CRTC 1990-73, *Unitel Communications Inc. and B.C. Rail Telecommunications/Lightel Inc. — Applications to Provide Public Long-Distance Voice Telephone Services and Related Resale and Sharing Issues: Scope and Procedure*, August 3, 1990.

Another body which has been involved in standards development relating to local networks is the Radio Advisory Board of Canada (RABC), which conducts standards development activity for telecommunications that make use of radio spectrum. RABC has set up an industry advisory Committee to consider standards for public cordless telephone networks. RABC's recommendation of a standard for these personal communications networks was recently adopted by the Department of Communications.

The most recently formed Canadian standards organization is the Telecommunications Standards Advisory Council of Canada (TSACC). TSACC is intended to be an umbrella organization for the other standards-setting bodies in Canada. It is intended to provide strategic direction for the setting of Canadian telecommunications standards. Membership in TSACC is open to the existing standards development organizations and others actively involved in the Canadian telecommunications market. TSACC's goal is to set priorities for standards development, not to develop standards.

Once a standard has been adopted, equipment is tested for conformity with the standard and then certified. Testing and certification is carried out by the DOC and by accredited private laboratories and manufacturers. The Canadian Interest Group on Open Systems (CIGOS), whose mandate it is to promote the principles of Open Systems Interconnection in Canada, is also interested in conformance testing.

At present, there is no public forum for standards-setting in the cable television industry in Canada which is analogous to the aforementioned telecommunications fora.

3.2.2 Regulatory Implementation of Telecommunications Standards

Standards are often adopted voluntarily by the telephone companies and manufacturers affected once they have been announced by the Department of Communications or by the CSA.

To the extent that it does become involved in the implementation process, the CRTC's current practice is to implement standards through the tariffs of the telephone companies. For example, in its final decision permitting the attachment of single-line and multi-line terminal equipment to the networks of Bell and B.C. Tel, the Commission specified that the companies' tariffs should specify the required terminal equipment standards. These standards therefore apply whether the equipment is attached by the company or by a subscriber:

> In order to be attached by either a carrier or a subscriber, single line terminal equipment (except TWX equipment) manufactured after 1 June 1983 must be of a type certified by

> DOC as meeting the appropriate TAPAC standards and bear a DOC label indicating such certification.[34]

A similar requirement was made regarding multi-line terminal equipment.

The new federal telecommunications bill (*Bill C-62*) as currently drafted, includes a provision that would permit more formal roles for both the Minister of Communications and the CRTC in the standards arena. Clause 16 states:

> 16. (1) The Minister may, where the Minister is satisfied that to do so will further the Canadian telecommunications policy objectives, by order made after consultation with the Commission, establish standards in respect of the technical aspects of telecommunications and require the Commission to give effect to them.
>
> (2) An order that incorporates a standard by reference may incorporate it as amended from time to time.
>
> (3) Any order proposed to be made under this section shall be published in the *Canada Gazette* at least 60 days before its proposed effective date, and a reasonable opportunity shall be given to interested persons to make representations to the Minister with respect to the proposed order.
>
> (4) A proposed order that is modified after publication need not be published again under subsection (3).

Should this clause be enacted as drafted, the Minister of Communications could make orders with respect to the standards governing the interconnection of networks as well as the connection of terminal equipment to telephone company networks. Standards announced by CSA/SCOT or TAPAC, or any other standards development body, could be adopted by reference in an order to the CRTC.

3.2.3 Open Network Architecture

The U.S. Federal Communications Commission (FCC) has developed the Open Network Architecture (ONA) concept over the course of a number of proceedings related to its Computer III docket.

ONA's basic approach is to break the network down into component parts, referred to as Basic Service Elements (BSEs). Each BSE was to be offered separately to all customers on a non-discriminatory basis at regulated tariff rates. This approach would permit competitive operations to be carried out within a regulated telephone company. However, the competitive unit of that company would be required to acquire BSEs at tariffed rates, that is the same component parts at the same rates, as its competitors.

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[34] Telecom Decision CRTC 82-14, *Attachment of Subscriber-Provided Terminal Equipment*, 8 C.R.T. Part 1(*b*), November 23, 1982, p. 848.

The FCC recognized that ONA was a long-term goal and concentrated on providing incentives for telephone companies to introduce ONA features into their network development plans. In the meantime, the FCC adopted a similar but less comprehensive plan known as Comparably Efficient Interconnection (CEI). CEI would permit a telephone company to file, on a service-specific basis, a plan to disaggregate the network elements required to provide the service. If the plan were approved by the FCC, the company could offer the service without being required to do so through a structurally separate affiliate.

Nine requirements were established for an acceptable CEI plan. These would also apply to ONA when it could be implemented. The requirements were:

- standardized hardware and software interfaces to be compatible with enhanced services of the telephone companies and their competitors;
- unbundling and separate rating of the basic services and functions underlying an enhanced service;
- telephone company enhanced service operations, and those of their competitors, are charged at unbundled rates;
- the same underlying basic services, with equal technical characteristics to those used by telephone companies' enhanced services, are to be provided to competitors;
- competitors must be provided installation, maintenance and repair services within the same time periods as those provided by the company to itself;
- where telephone companies provide their customers with abbreviated dialling or signalling to gain access to its enhanced services, it must provide the same capabilities to customers of competitors;
- a telephone company's CEI facilities must be provided to its competitors soon enough so that they can use the facilities to provide an enhanced service when the carrier begins to offer its service over those facilities;
- telephone companies must take all reasonable steps to minimize transport costs for competitors who are denied the right to collocate their facilities with company facilities; and

- CEI offerings must be generally available, not restricted to any classes of customers.

The approach outlined in the Computer III proceeding also included measures to limit the ability of a telephone company to provide competitively useful technical and other information to affiliated enhanced service providers while withholding it from competitors.

The element of standardization in the ONA approach and the flexibility to configure a system to one's own specifications make the concept of open networks tariffed on the basis of BSEs attractive to sophisticated telecommunications users as well as the telephone companies.

3.3 Telephone/Cable Cross-Ownership

3.3.1 Eligibility to Hold a Broadcasting Licence

Several existing regulatory and statutory provisions prevent telephone companies from owning or operating broadcasting undertakings, including cable operations.

The earliest prohibition was established at the time of the passage of the *Broadcasting Act, 1968*. The same year, the *Bell Canada Special Act* was amended to restrict Bell's power as follows:

> 5(2) Notwithstanding subsection (1), the Company and its subsidiaries do not, however, directly or indirectly or by any other means, have the power to apply for or to be the holder of a broadcasting licence as defined in the Broadcasting Act,or of a licence to operate a commercial Community Antenna Television Service.

A similar prohibition on Bell Canada was carried forward into the new *Bell Canada Act*[35] of 1987 at section 7 which reads:

> Prohibition re broadcasting. — Neither the Company nor any person controlled by the Company shall directly or indirectly hold a broadcasting licence or operate a broadcasting undertaking within the meaning of the *Broadcasting Act*.

Bell is the only carrier specifically prohibited from holding a broadcasting licence.

The Commission considered the larger question of the relationship between the common carriers and cable operators in 1969, and issued a public announcement on December 3, 1969.[36] The Commission recognized the role of telephone companies in developing cable television and expressed the hope that the two industries would be able to cooperate while each retained control of its own systems. It reached the conclusion, however, that "it would not be in the public interest to encourage common carriers to hold licences for CATV systems". The announcement indicated that exceptions might be made for smaller common carriers who were the only entities capable of providing cable service to smaller population centres.

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[35] S.C. 1987, c. 19, in force June 25, 1987; as amended by 1987, c. 34, s. 302, proclaimed in force January 1, 1988.

[36] CRTC Public Announcement, *Licensing Policy in Relation to Common Carriers*, December 3, 1969.

3.3.2 Restrictions on Operating a Telephone System or Line

There are no statutory impediments at present to entering the telecommunications business as a telephone company. In practice, entry into the market can be closely controlled by the CRTC through exercise of its power to rule on applications for interconnection with the facilities of one or more of the telephone companies within its jurisdiction. It is virtually impossible to operate a telecommunications system for the public without being permitted to interconnect with the existing Public Switched Telephone Network. The Commission's discretion as to the terms on which it can order interconnection is broad. For example, subsection 336(1) of the *Railway Act* provides:

> 336(1) Whenever any company, province, municipality or corporation, having authority to construct and operate, or to operate, a telephone system or line and to charge telephone tolls, whether that authority is derived from Parliament or otherwise,
>
> (a) is desirous of using any telephone system or line owned, controlled or operated by the company, in order to connect that telephone system or line with the telephone system or line operated or to be operated by the first mentioned company, or by the province, municipality or corporation for the purpose of obtaining direct communication, whenever required, between any telephone or telephone exchange on the one telephone system or line and any telephone or telephone exchange on the other telephone system or line, and
>
> (b) cannot agree with the company with respect to obtaining that use, connection or communication,
>
> the first mentioned company or province, municipality or corporation may apply to the Commission for relief, and the Commission may order the company to provide for that use, connection or communication, on such terms, including compensation if any, as the Commission deems just and expedient, and may order and direct how, when, where, by whom, and on what terms and conditions that use, connection, or communication shall be had, constructed, installed, operated and maintained.

Accordingly, a cable operator seeking to offer public telecommunications services might apply to the CRTC for an order of interconnection to the facilities of one or more telephone companies, if such interconnection was required.

In its decision on CNCP Telecommunications' 1983 application to interconnect with Bell and B.C. Tel to provide competitive long distance voice service, the Commission ruled that it would not restrict competitive entry into local telecommunications markets except to provide primary exchange voice service.[37] Interconnected data and other private line services have since been offered competitively in light of that decision. The Department of Communication's recent liberalization of the local private microwave radio licensing policy may result in increased activity in local private line networks that are competitive with telephone company offerings.

The extent of regulation of cable operators and others entering telecommunications markets, as facilities-based carriers or resellers, will be subject to change as a result of several CRTC decisions released as this Appendix was being written. On June 11, 1992, the CRTC granted an application by Bell Canada to have Rogers Network Services, a division of Rogers Communications Inc. which offers local business telecommunications services in a few Canadian cities, declared to be a "company" under the *Railway Act* and thus subject to rate regulation and the other provisions of the *Railway Act*.[38] In a related decision released the same day,[39] the CRTC concluded that telecommunications service resellers are also "companies" subject to the provisions of the *Railway Act*. Finally, on the following day, June 12, 1992 the CRTC released its decision on *Competition in the Provision of Public Long Distance Voice Telephone Services and Related Resale and Sharing Issues*,[40] which will have significant impact on the provision and regulation of long distance and local telecommunications services.

If *Bill C-62* is passed as it is presently drafted, anyone seeking to become a "Canadian carrier" will have to seek and be granted a licence by the Minister of Communications in addition to any requirements the Commission may impose. Canadian carriers will also be subject to a Canadian ownership and control requirement -- something that has existed for broadcasting licensees since 1969.

3.4 The Carriage/Content Distinction

3.4.1 Restrictions on Provision of Content by Telephone Companies

Of the federally regulated Canadian telephone companies, only Bell Canada is subject to a legislative restriction against involvement with the content of its services. Section 8 of the *Bell Canada Act* requires Bell to act solely as a telecommunications common carrier where it provides transmission services or facilities. Where it does so, the section specifically prohibits Bell from controlling the contents or influencing the meaning or the purpose of messages it transmits, emits, or receives. However, while no statutory provision restricts other telephone companies to a carrier role, the CRTC has, in a number of cases, taken a similar regulatory approach to them as to Bell Canada.

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[37] Telecom Decision CRTC 85-19, *Interexchange Competition and Related Issues*, 11 C.R.T. Part 1(*b*), August 19, 1985, p. 1611.

[38] Telecom Decision CRTC 92-10, *Bell Canada v. Rogers Cable T.V. Ltd. Carrying on Business as Rogers Network Services — Application to Require the Filing of Tariffs of Tolls by Rogers Cable TV Ltd.*, June 11, 1992.

[39] Telecom Decision CRTC 92-11, *Application by TWU — Status of Resellers under the Railway Act*, June 11, 1992.

[40] Telecom Decision CRTC 92-12, June 12, 1992.

In the U.S. a variant of the carrier/content distinction was translated into one of the major restrictions on the Bell Operating Companies (BOCs) following their divestiture from AT&T. The BOCs were prevented from offering information services by Judge Harold Greene's Modified Final Judgment on the breakup of AT&T (see Appendix D).

A somewhat related policy was established in 1975, when a joint policy statement of the Canadian Departments of Finance and Communications stated that telecommunications carriers should not offer data processing services commercially except through an arm's length corporation. The structurally separate entity would be required to keep its own books of account and account, separately for personnel, premises and equipment. This policy became increasingly problematic with the converging of computer and telecommunications technologies, for example in the local telephone switches.

In its 1984 decision on enhanced services, the CRTC discussed the meaning of the legislative prohibition set out in Section 8 of the *Bell Canada Act* and the issue of whether it should be applicable to other carriers, concluding:

> Based on the record of this proceeding, it is the opinion of the Commission that Bell should not be permitted to engage in electronic publishing involving editorial control over content or in the creation or distribution of its own data bases. Moreover, the Commission considers that the principle of separation of control over carriage and content should apply to other federally regulated common carriers where their participation in the electronic publishing and data base markets would prejudice the diversified development of this field.[41]

The Commission referred to Decision 84-18 when it was asked to approve Bell Canada's market trial of its Alex service. Alex was described as "a network-based gateway service which, through a Bell-provided videotex terminal or suitably equipped personal computer, allows customers to access various electronic information and transaction services, including an electronic telephone directory service that Bell itself proposes to offer".[42] In the result, Bell was allowed to proceed to a market trial of Alex subject to special cost-tracking provisions, but was not allowed to offer electronic yellow pages on the grounds that it might violate the requirement in Section 8 of the *Bell Canada Act* to act solely as a common carrier. Bell was permitted to provide electronic white pages, since the Commission considered this to be part of its common carrier function.

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[41] Telecom Decision CRTC 84-18, *Enhanced Services*, 10 C.R.T. Part 1(*a*), July 12, 1984, p. 486 and p. 503.

[42] Telecom Decision CRTC 88-16, *Bell Canada — Alex Market Trial*, September 30, 1988.

It is proposed in *Bill C-62* to amend section 8 of the *Bell Canada Act* in order to make it generally applicable to Canadian carriers. Clause 41 would provide:

> 41. Except where the Commission approves otherwise, a Canadian carrier shall not control the content or influence the meaning or purpose of telecommunications carried by it for the public.

As well as simplifying the language, Clause 41 would give the Commission the power to approve departures from the general principle.

3.4.2 Provision of Content by Cable Operators

In contrast to the general prohibition on telephone companies controlling or influencing the content of messages they carry, most cable operators are required to generate or alter the signals they carry in a limited but nonetheless significant number of instances.

First, cable operators are generally required to provide a community programming channel (see section 2.2.4 above). All but the smallest operators are required to devote at least 5% of their basic service revenue to the cost of producing local programming and operating the community channel.

Second, each Class 1 cable licensee is required, at the request of a local or regional broadcaster, to "curtail its distribution of the programming service of a television station and substitute the identical programming service of a local television station or a regional television station",[43] subject to direction from the Commission that such substitution is not in the public interest. Class 2 licensees may substitute programming unless directed not to by the Commission or by condition of licence; simultaneous substitution by Part III licensees is governed by condition of licence.

With respect to cable operator distribution of non-programming services, the CRTC stated in 1986:

> If a service, other than a programming service, is to be distributed, no authorization from the Commission is necessary.[44]

The Regulations define programming service as follows:

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[43] s. 20(2) of the *Cable Television Regulations, 1986.*

[44] Public Notice CRTC 1986-182, *Cable Television Regulations — Regulations Respecting Broadcasting Receiving Undertakings*, August 1, 1986.

2. programming service means any combination of images, sounds or images and sounds including a commercial message, other than an alphanumeric service, that is designed to inform or entertain the public and is;

(a) transmitted to a cable-head end over the air, by microwave or satellite relay or by means of a hard wire feed, or

(b) distributed by a licensee.

As will be seen below, there are requirements that cable operators separate the costs of non-programming services from programming service activities. However, there is no prohibition on the generation (or carriage) of non-programming services by cable operators.

3.5 Regulation of Competition in the Local Broadband Market

3.5.1 Introduction

Two basic regulatory principles have been applied by the Commission in evaluating plans by telephone companies and cable operators to enter competitive or potentially-competitive fields of business outside of their core monopoly services.

The first principle is that regulated companies should not be able to cross-subsidize their activities in competitive markets from revenues generated by their monopoly activities. Such cross-subsidy could result in monopoly subscribers paying excessive rates where they have no choice of service provider, and in the prices of competitors being undercut by the regulated company.

The second principle is that a carrier should not be able to discriminate unfairly in favour of or against any person, including competitors, customers and itself.

3.5.2 Detection and Prevention of Cross-Subsidy

3.5.2.1 Telephone Company Regulation

As explained above, the CRTC has evolved a costing method to identify the revenues and costs associated with different categories of services provided by the telephone companies it regulates. The Phase III methodology can thus, in theory, detect cross-subsidies flowing from broad categories of monopoly services to competitive services. If it is convinced that such cross-subsidies exist and are not in the public interest, the Commission may order the telephone company in question to change its tariffed rates for competitive service to a level that covers all associated costs. The CRTC can also order rate changes for monopoly services so that the revenue used to cross-subsidize competitive services is no longer available to the company.

It should be noted that there are some cross-subsidies between telephone rates which the Commission has determined to be in the public interest. For example, rates for basic long distance voice services, such as message toll service and wide area telephone service (WATS), have traditionally been higher than required to cover the cost of providing the services. The excess is treated as a contribution to recovering the costs allocated to the access category. The Commission considers that the contribution is necessary to keep basic local service rates at current levels, which it believes permits affordable universal access to local service. Another example is the cross-subsidy which is assumed to flow from urban to rural subscribers in some telephone systems. Although the cost of serving an urban customer is often lower than the cost of serving a rural customer, rural rates for basic service are kept low to reflect the "value" of the service to those customers.

Phase II of the CRTC's Cost Inquiry is also intended to detect underpricing of new competitive services or overpricing of new monopoly services when they are proposed. Since the proponent of the new service must demonstrate to the Commission's satisfaction that the expected revenue stream for the service over a study period (typically 10 years) exceeds the expected incremental costs of providing the service, uneconomic pricing should be detectable. The Commission generally requires new services to carry a share of the burden of contributing to the maintenance of low local rates in addition to covering incremental costs.

3.5.2.2 Regulation of Cable Operators

The Commission has developed different cost separation procedures to ensure that discretionary cable services are priced to cover their costs, and that those costs are not borne by basic cable rates. While these are not as complex as the Phase II and Phase III Cost Inquiry methodologies, they are aimed at preventing cross-subsidy from basic services offered by cable operators to their discretionary services.

The CRTC addressed cost separation and recovery for the provision of non-programming services and discretionary programming services in Public Notice CRTC 1987-123.[45] In Public Notice 1986-182 the Commission had expressed the principle that basic service subscribers should not directly nor indirectly subsidize the provision of discretionary programming or non-programming services.

With Public Notice 1987-123 the Commission circulated recommendations of the Canadian Cable Television Association concerning accounting for non-rate-regulated services. Its decision on this matter was included in a general review of its rate-regulation of cable services, contained in Public Notice CRTC 1990-53.[46]

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[45] *Calls for Comments on Cost Separation Requirements for the Cable Industry*, May 4, 1987 (CRTC Broadcasting Decisions and Notices, Vol. 2, No. 93).

[46] *Cable Television Regulations, 1986 — Changes to the Regulation of Subscriber Fees and Related Matters*, May 15, 1990 (CRTC Broadcasting Decisions and Notices, Vol. 5, No. 91).

The Commission applies an incremental costing approach to separate the costs of discretionary programming services from basic services. Incremental costing is also the starting point for the separation of non-programming service costs. However, non-programming services are also required to recover a portion of common facilities operating costs and a portion of annual capital expenditures and total historical costs for distribution costs and subscriber drops in use at the end of each year.

The contribution of non-programming services to common and plant capital costs is calculated using a formula of the ratio of gross revenues from non-programming services to total gross revenues. The gross revenue calculation in each case includes revenue from equipment rental, except that in the calculation of total gross revenues, revenue from the rental of converters used exclusively with the delivery of programming services is excluded. Cable licensees are required to file annual returns identifying total gross revenues by source, all incremental costs and the share of common costs related to the provision of basic and non-programming services. Once the Commission has detected a potential cross-subsidy from basic to discretionary services, including non-programming services which could be competitive, it can correct for the problem by scaling back future rate increases applied for by the licensee. The CRTC does not roll back basic rates of its own motion.

3.5.3 Prevention of Unjust Discrimination

The CRTC's ability to prevent unjust discrimination is a cornerstone of its jurisdiction over telephone companies under the *Railway Act*. Subsection 340(2), reproduced above at Section 1.3.1, includes a provision that shifts the onus to a telephone company to justify any discrimination, etc., once it has been shown that the company does indeed discriminate or give a preference or advantage. The principle that a telephone company should not discriminate unjustly has been carried forward into *Bill C-62*, using the following language:

> 33(2) No Canadian carrier shall, in relation to the provision of a telecommunications service or the charging of a rate for it, unjustly discriminate or give an undue or unreasonable preference toward any person, including itself, or subject any person to any undue or unreasonable disadvantage.
>
> . . .
>
> (4) The burden of establishing before the Commission that any discrimination is not unjust or that any preference or disadvantage is not undue or unreasonable is on the Canadian carrier that discriminates, gives the preference or subjects the person to the disadvantage.

The obligation is not absolute, since the Commission is directed in *Bill C-62* (as it was in the consequential amendment to the *Railway Act* which appeared in the *Broadcasting Act, 1991*) to have regard to the broadcasting policy for Canada set out in the *Broadcasting Act* when it is determining whether a discrimination is unjust, or a preference or disadvantage is undue or unreasonable, with relation to a program delivered in whole or in part using the facilities of the Canadian carrier.[47]

There are currently no explicit obligations on cable operators not to discriminate against third-party providers of non-programming services.

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[47] *Bill C-62*, Clause 34.

APPENDIX D

AN INTERNATIONAL PERSPECTIVE ON CONVERGENCE ISSUES

APPENDIX D

AN INTERNATIONAL PERSPECTIVE ON CONVERGENCE ISSUES

Canada is not alone among developed countries in having to deal with the issue of convergence between telecommunications and broadcasting. This Appendix examines how some of these other countries are addressing the issue. It surveys relevant developments in the United States, the United Kingdom and Japan, and then describes some of the work that the Organisation for Economic Co-operation and Development (OECD) has done on convergence. The chapter concludes with a review of trends in the European Community, the International Telecommunication Union and the General Agreement on Tariffs and Trade (GATT).

1.0 LOCAL NETWORKS CONVERGENCE IN THE UNITED STATES

1.1 Overview

In the U.S. two important questions in the ongoing debate on local networks convergence have been: (1) whether the ban on telephone/cable company cross-ownership contained in the *Cable Communications Policy Act of 1984* should be repealed; and (2) whether the Modified Final Judgment (MFJ) restriction on telephone companies' provision of information services should be ended. At the present time, the cross-ownership ban remains in effect, but Congress continues to give consideration to bills that include provisions that would end the ban. Judicial review of the MFJ restriction has put its continuing legal validity in serious question, but this will not be resolved conclusively until current appeals are exhausted.

An important contribution to the continuing discussion of convergence was the major public consultation on telecommunications infrastructure policy conducted between January 1990 and October 1991 by the National Telecommunications and Information Administration (NTIA) of the U.S. Department of Commerce. NTIA recommended that the 1984 cross-ownership ban be repealed and that local exchange carriers (LECs) be allowed to provide video programming themselves as long as they also offered video transmission capacity to unaffiliated program providers on a common carrier basis, without discrimination, and provided there were safeguards against cross-subsidization. At the same time, NTIA called for removal by the Federal Communications Commission (FCC) and the states of existing legal barriers to competition in the local exchange services market.

The FCC has been on record since 1988 as recommending that Congress repeal the 1984 telephone/cable cross-ownership ban. In an October 1991 announcement, the FCC referred again to this recommendation and, at the same time, called for public comments on a proposed video dialtone policy. Comments filed by the deadline of January 23, 1992, in essence, indicated that the telephone industry thought the FCC's proposed video dialtone policy did not go far enough. In this industry's view, the policy was too prescriptive and restrictive. Others, such as the cable industry, believed the Commission's video dialtone proposal went too far.

Cable operators were concerned that the proposed safeguards against anti-competitive practices by the telephone companies would prove to be inadequate.

A significant theme in the convergence debate has been the notion that the U.S. needs to rise to the challenge of competitiveness posed by the plans of Japan's major carrier Nippon Telegraph and Telephone Public Corporation (NTT), to build a fibre optic network throughout Japan by the year 2015.[1] The proposed *Communications Competitiveness and Infrastructure Modernization Act of 1991* introduced in Congress in June 1991 and still under consideration there is designed as a way of meeting the challenge.

Another legislative proposal, introduced in Congress in the fall of 1991, called for a *Telecommunications Act of 1991*. It too is still under study. This Bill can be seen as a response in Congress to the possibility that the courts will, once and for all, render the MFJ restriction on telephone companies' provision of information services invalid. The Bill would impose a "bottleneck test" of local exchange competition that would have to be met before Bell Regional Holding Companies (RHCs) could enter the information services market in their area.

These various developments are surveyed below, beginning with the proposed *Communications Competitiveness and Infrastructure Modernization Act of 1991*, introduced in June 1991. The discussion of this Bill is followed by an account of developments during 1991 in the judicial interpretation of the MFJ restriction, which in turn gave rise to the Bill in the fall of that year proposing a *Telecommunications Act of 1991*. The survey concludes with sections describing some of the details of NTIA infrastructure report of October 1991 and the FCC's video dialtone proposal.

1.2 Proposed Communications Competitiveness and Infrastructure Modernization Act of 1991

1.2.1 Introduction

A Bill proposing a *Communications Competitiveness and Infrastructure Modernization Act of 1991* was introduced in the Senate on June 5, 1991,[2] on the same day that a similar Bill was introduced in the House of Representatives. The Senate Bill was introduced by Senators Conrad Burns (Republican - Montana) and Albert Gore (Democrat - Tennessee), the House version by Representatives Rick Boucher (Democrat - Virginia) and Mike Oxley (Republican - Ohio).[3]

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[1] As indicated in section 3.4 (below), NTT officials have recently indicated that, due to the current economy and uncertain customer demand, NTT no longer considers the goal of completing its fibre network by 2015, as being realistic.

[2] United States of America, Congressional Record, Proceedings and Debates of the 102nd Congress, First Session, Vol. 137, No. 85, Washington, Wednesday, June 5, 1991, The Communications Competitiveness and Infrastructure Modernization Act of 1991, S. 1200.

[3] "To Get Broadband Network, Bills Let Independents Into Cable TV," *FCC Week*, June 10, 1991, p. 7.

Both versions of the Bill propose measures that would lift the existing ban on telephone company entry into the cable television business. The lifting of this ban would be used as a carrot to encourage American telephone companies to deploy fibre optic networks throughout the United States, in order to maintain United States competitiveness in the face of plans by NTT to build a fibre optic network throughout Japan by the year 2015. Unless the current rate of fibre optic deployment in the United States accelerates, it is not expected to have a network comparable to that planned by Japan until the year 2040.[4]

1.2.2 Content of the Bill

The effect of the legislation would be limited to the independent telephone companies because it would not touch the Consent Decree, which bans the RHCs from providing information services. The legislation was introduced before Judge Harold Greene's decision of July 25, 1991, concerning the question of whether this restriction should be lifted. Whether the legislation would ultimately apply to the RHCs will depend on the outcome of the appeal of Greene's July 25 decision.

The Bill would place a number of restrictions on telephone companies seeking to enter the cable television business and would ban them from buying an existing cable television company in their local exchange area.

The legislation would also require that telephone companies wishing to engage in video operations establish video subsidiaries that would be separate from the companies' telephone operations. Neither the subsidiary nor the telephone company would be able to sell both video and telephone service nor would they be able to hold real or personal property in common. Much of the regulation involved would be in the hands of state public utilities commissions (PUCs), to which the telephone company would need to submit a plan detailing its planned video service.

This plan would have to include estimates of construction costs, a description of the technology involved, a detailing of how the telephone company's existing plant would be displaced by the broadband system and a schedule designed to have the system completed by 2015, the same year that NTT has planned as the completion date of its fibre optic network.

Under the proposed legislation, telephone companies initially would be permitted only to transport broadcasts created by others. A telephone company would have to obtain certification of its plan from the state PUC and the FCC before the company would be able to license, package, own and produce video programming. Even then, the telephone company's cable television subsidiary would still have to make available 75% of its cable capacity to unaffiliated programmers.

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[4] "Bi-partisan group introduces telco entry bill," *Broadcasting*, June 10, 1991, p. 76.

Should a telephone company violate any of the safeguards proposed in the Bill, a "death penalty" clause would require that it divest itself of its video subsidiary.

1.2.3 Reactions to the Bill

Reaction from the Bush Administration was reported as generally positive. NTIA Director Janice Obuchowski told the House Telecommunications Subcommittee[5] that the Administration was likely to support the general thrust of the proposed new policy, with the possible exception of the 2015 target date. She is reported as having said that imposing such a deadline "gets pretty close to industrial targeting" policies which President Bush has opposed strongly. Ms. Obuchowski repeated the Administration's support for the video dialtone approach to telephone company entry into the cable television business, but she stopped short of explicitly endorsing the proposed legislation.

National Cable Television Association (NCTA) President James Mooney called the Bill "thinly disguised industrial policy under which consumers would be taxed hundreds of billions of dollars in the form of higher phone bills to subsidize the construction of a phone company-controlled telecommunications infrastructure that would not be completed for 25 years."[6] Community Antenna Television Association (CATA) President Steve Effros said the Bill was "little more than a veiled attempt to mandate telco entry into cable television and other information services."[7]

National Association of Broadcasters (NAB) President Edward Fritts compared the Bill to a similar proposal introduced last year. He said, "The packaging is new, the labelling is improved, but the product itself hasn't changed since last year. We continue to oppose telephone companies' entry into program content and believe the porous safeguards set out in the Bill are inadequate to protect consumers and telcos' competitors."[8]

United States Telephone Association (USTA) President John Sodolski said allowing telephone companies into video "will stimulate the deployment of a modern communications network as well as giving consumers a true choice."[9] Ameritech Vice-President John Connarn said the Bill would ensure the "earliest possible deployment" of a fibre network and he described competition for cable as the best way to achieve competitive rates and greater programming options.[10] U.S. West Vice-President Laird Walker saw "a good starting point for dialogue on the telecommunications and infrastructure issue" and modernization of the infrastructure is "vital to our economic future."[11] GTE, the United States' largest independent telephone company, commended the goal of the Bill, calling it as far-reaching as the decision to put a man on the moon.[12]

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[5] "Cable-Telco Bills Offered," *Television Digest*, June 10, 1991, p. 3.

[6] See note 4, p. 77.

[7] See note 5, p. 3.

[8] See note 4, p. 77.

[9] *Ibid*, p. 77.

[10] See note 5, p. 3.

[11] *Ibid*.

Comments made by FCC Chairman Alfred C. Sikes at a conference on the same day that the Bill was introduced were not explicitly directed at the Bill. Nevertheless, they suggest that he could be supportive of the Bill.

Sikes foresaw "a world where broadcasting, cable television, telephones, and computers all will interface."[13] He asked the leaders of these industries to "sit down and actively explore what they might accomplish together . . . More industry co-operation -- and less confrontation -- might help every one concerned and, most importantly, the country. All over the world -- in Germany, France, and Japan -- business and government are cooperating. They're working together to develop the best possible national communications infrastructure."

Sikes went on to say, "Our thinking has to change. Yesterday's lines of demarcation will keep blurring. And today's broadcasting, cable, satellite and telephone companies will become tomorrow's broadly diversified firms. Regulators, business leaders, and the organized Bar all need to be as flexible and adaptable as today's communications and information technology."

He acknowledged, "this might challenge the way Washington has traditionally done business. Trade associations -- even the occasional Washington lawyer -- sometimes seem more interested in precipitating or prolonging conflicts rather than working toward a mutually satisfactory resolution. The FCC's high-definition experience underscores the potential of affirmative collaboration."

The FCC Chairman believed that the United States' communications infrastructure issues "present an area where good politics -- assembling groups, identifying a common denominator, and working affirmatively to accomplish shared goals -- on the part of all of the industry's leaders would stand them and the American public in good stead. Faction and divisiveness are the natural enemies of forward progress." He encouraged adoption of "a new communications policy manifesto" and suggested that industry segments start "measuring each other's resources" and exploring "promising alliances."[14]

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[12] *Ibid.*

[13] "Sikes calls for more cooperation, less confrontation, in converging industries," *Telecommunications Reports*, June 10, 1991, p. 11.

[14] *Ibid.*, p. 11.

1.3 Lifting of MFJ Restriction on Telephone Companies' Provision of Information Services

1.3.1 Background

Under the 1982 Consent Decree between the American Telephone and Telegraph Company (AT&T) and the Department of Justice, and the subsequent MFJ of U.S. District Court Judge Harold H. Greene, the RHCs were prohibited from providing information services, except for publication of yellow pages directories. Judge Greene reaffirmed this prohibition in his first review of the MFJ in 1987.[15]

However, on April 3, 1990, in a remand order, the U.S. Court of Appeals for the District of Columbia directed Judge Greene to reconsider the position he took in his 1987 review.[16] In the remand order, the Appeals Court ruled that Judge Greene had applied the wrong section of the Consent Decree when, in his 1987 review, he had denied the RHCs' request to have the information services prohibition lifted.[17]

The Appeals Court said that Judge Greene should have used a section that calls for approval of attempts by the phone companies to move into new industries if the effort is "within the reaches of the public interest."[18] Judge Greene had relied on another, more stringent section of the Consent Decree that allowed such moves only if "there is no substantial possibility that . . . [the RHC] could use its monopoly power to impede competition in the market it seeks to enter."[19]

1.3.2 Judge Greene's Decision of July 25, 1991

On July 25, 1991, Judge Greene announced the result of the reconsideration that he had carried out as a result of the Appeals Court's 1990 remand order.[20] In his July 25 decision, Greene ruled that the RHCs could offer information services, but he stayed his decision pending the outcome of an appellate review, saying he "cannot be certain of the correctness" of his interpretations of the 1990 remand order.[21]

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[15] *Competition in Public Long-Distance Telephone Service in Canada*, Report of the Federal-Provincial-Territorial Task Force on Telecommunications chaired by L.R. (Bud) Sherman, December 1988, pp. 21-22.

[16] "Unanimous Appeals Court remands triennial review's information services decision to Greene for further proceedings under 'public interest' standard," *Telecommunications Reports*, April 9, 1990, p. 1.

[17] "Court remands info service ban to Greene, upholds other bans," *FCC Week*, April 9, 1990, pp. 1-3.

[18] *Ibid.*, p. 3.

[19] *Ibid.*, p. 2.

[20] "Judge Allows Phone Companies To Provide Information Services: Opponents Fear Monopoly Abuse by 'Baby Bells'," (By Keith Bradsher, Special to The New York Times), *The New York Times*, Friday, July 26, 1991, pp. A1, A14.

[21] "Greene Frees Bells to Enter Information Services," *FCC Week*, July 29, 1991, p. 1.

In the words of the decision, "While . . . the evidence persuades this court that entry of the regional companies into the information services market would allow them quickly to dominate that market and to eliminate both competition and the independents which would make the competition possible, the question under the appellate mandate is whether this court is *certain* that removal of the information services restriction would have such an effect. The answer to that question is in the negative."

Much of Judge Greene's decision is devoted to pointing out the weaknesses in arguments by the RHCs, the Department of Justice and other intervenors that the Bell companies are not likely to use their basic, local telephone monopolies to impede competition in information services markets.[22]

Judge Greene said the RHCs would clearly be able to exercise "market power" in information services if the prohibition were lifted. "In fact, around 99% of the traffic to the ultimate subscriber must still pass, in the end, through the regional companies' local loops. This basic circumstance gives these companies the ability to exercise market power with respect to the information services markets; that is, to raise price, to restrict output, or both." The RHCs would be able to discourage competitors by using "strategic predatory pricing" and then shifting costs onto regulated operations.

By virtue of the RHCs' indispensable and ubiquitous local wires and switches, the regional companies would possess "market power" in the information services market.

Moreover, Greene thought that federal or state regulators would not be able to detect effectively discriminatory practices and cross-subsidies if RHCs offered information services. "Although the current regulations include a number of new features, on balance they are, if anything, less likely to be effective than those that were supposed to constrain the Bell System [before the 1982 Consent Decree and the MFJ]."

Judge Greene cited a study by Stanford University Professor Roger Noll that concluded there were two reasons why the RHCs would be certain to allocate costs, vary service quality or bias technology in favour of their own information services. "One [reason] is the absolute certainty that some such strategies will succeed. The other is that such strategies, even if detected, will provide an interim period of excess profits because they impose handicaps on rivals and raise entry costs in the form of litigation to induce regulators and courts to overturn the offending practices."

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[22] *Ibid.*, p. 5.

1.3.3 Judge Greene's Stay Lifted October 7, 1991

As a result of legal action taken by the seven RHCs,[23] the U.S. Court of Appeals for the District of Columbia on October 7, 1991, lifted the stay that Judge Greene had imposed on his decision of July 25, 1991, and the Court thereby let the RHCs into information services.[24] However, proponents and opponents of telephone company entry into information services are likely to continue to do battle in the courts, in Congress and in front of the FCC. Major investments by the RHCs in information services are unlikely until the situation is clarified.

Opponents of the RHCs' entry into information services include the newspaper industry, some long-distance telephone companies and consumer groups. The Consumer Federation of America (CFA), for example, has argued that removing the restriction on information services could prompt the RHCs to spend too much money on fibre optic cables and other sophisticated equipment that is currently used most heavily by businesses.[25]

1.4 Proposed Telecommunications Act of 1991

The Bill (H.R. 3515) proposing the *Telecommunications Act of 1991* was introduced in the House of Representatives on October 8, 1991, by Representative Jim Cooper (Democrat Tennessee) joined by other sponsors.[26] A similar bill (S. 2112) has been introduced in the upper chamber of Congress by Senate Communications Subcommittee Chairman Daniel Inouye (Democrat-Hawaii).[27]

Under H.R. 3515, RHCs would eventually have the right to enter into information services in their own region, but they first would have to face competition in the local loop.[28] Before entering the information services business, RHCs would have to meet a two-step "bottleneck" test: (1) at least 50% of businesses and residences in an area must have access to alternative transmission and switching facilities equal in quality to those offered by the Bell Operating Company (BOC) for the delivery of information services; and (2) at least 10% of those businesses and residences must subscribe to information services offered over the alternative networks.[29] Until such alternative local transport arrangements are developed, the bottleneck test would be impossible to pass. In addition to the test, the Bill contains provisions requiring information services to be offered through a separate subsidiary and prohibiting cross-subsidization of these services.[30]

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[23] "RHCs Seek End Of Stay On Information Services Order," *FCC Week*, August 5, 1991, p. 6. "Greene Denies Removal of Information Services Order Stay," *FCC Week*, August 12, 1991, p. 8. "RHCs Ask Court to Vacate Stay of Information Services Ruling," *FCC Week*, September 16, 1991, p. 9.

[24] "Info Services Stay Lifted; But More Obstacles Loom Over Bells," *FCC Week*, October 14, 1991, pp. 1 and 8.

[25] See note 20, p. A1.

[26] "Legislative Update," *FCC Week*, October 21, 1991, p. 11.

[27] "Power of the Press vs. the Baby 'Behemoths', "*Broadcasting*, February 24, 1992, p. 29.

[28] See note 24, p. 9.

[29] *Ibid.*, p. 10.

The Bill would call upon the FCC to enforce network quality standards and to determine when the bottleneck standard for local competition is met. At least one FCC staff member predicted that these additional duties for the FCC would require more resources at a time when Congress had been cutting funds from the FCC's budget.[31]

1.5 NTIA Infrastructure Report

1.5.1 Overview

In October 1991, NTIA issued, *NTIA Infrastructure Report: Telecommunications in the Age of Information.*[32] This was the culmination of a major public consultation that began with a Notice of Inquiry published by NTIA in January 1990. Four public hearings were held in cities across the U.S. and interested members of the American public filed some ten thousand pages of written comments. More than 130 parties participated, including telecommunications service providers, state regulators, state and regional development organizations, large telecommunications users, consumer groups and academics. The purpose of the study was to determine what government in the United States can do to foster competitive markets to ensure that the American people will have the best possible, affordable telecommunications infrastructure. Rather than "describe some ideal design that would be suitable at all times and in all places", the report described a "process that can help produce the best infrastructure for the citizens" of the U.S.

1.5.2 Cable-Telephone Company Infrastructure Development

Concerning cable-telephone company infrastructure development, the report recommended:[33]

- removal of the current telephone company/cable cross-ownership restrictions in the *Cable Communications Policy Act of 1984* and FCC rules. LECs should be able to provide or package video programming themselves over their own facilities, so long as they also;
    - offer video transmission capacity on a common carrier basis to unaffiliated program providers, and

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[30] *Ibid.*, p. 10.

[31] *Ibid*, p. 10.

[32] U.S. Department of Commerce, National Telecommunications and Information Administration, *The NTIA Infrastructure Report: Telecommunications in the Age of Information*, October 1991, NTIA Special Publication 91-26, p.1.

[33] *Ibid.*, p. xx and pp. 226-246.

- are subject to FCC safeguards designed to prevent discrimination against competitors and improper cross-subsidization.

The report endorsed the "common carriage" requirement of NTIA's earlier "video dialtone" proposal. The October 1991 study found that for regulatory purposes, video services can generally be treated as another type of "enhanced service" for which the FCC's Open Network Architecture (ONA) regime should be generally applicable. Nevertheless, NTIA report suggested that the FCC should examine, in a rulemaking proceeding, whether video services require any modifications or additions to the ONA rules in order to protect against discrimination or promote efficiency.

The study found that the FCC's accounting and cost allocation rules can adequately control the danger of cross-subsidization of LECs' programming activities by its regulated operations.

The report suggested that LEC entry into the video programming business would be one important way to expand competition in the provision of video programming to the home, offering direct competition to incumbent cable systems. In addition, requiring LEC channel capacity to be made available on a common carrier basis would multiply opportunities for entry by independent program providers.

The report noted that electronic mass media markets are characterized by a wide variety of vertical arrangements and cross-investments among producers, packagers and distributors. In particular, the cable television industry has made extensive investments, in return for ownership interests, in much of the currently available cable network programming. The report suggested that in light of these market place realities, potential competitors, including LECs, should also have the opportunity to invest in the development of their own programming to compete against incumbent cable systems.

1.5.2 Local Exchange Competition

Concerning local exchange competition, the study found that technological and market place changes are steadily increasing the potential for competitive entry in major parts of the local exchange market.[34] Digital technology could increase cellular radio's ability to compete with local exchange telephone service. Cable operators' installation of fibre optic facilities will improve their ability to compete with LECs. Future development of Personal Communications Service (PCS) will further enhance the prospects of local exchange competition from radio-based telecommunications services. However, a major barrier to increased competition in much of this market place is government regulation, including direct prohibitions on entry.

Accordingly, NTIA recommended that the FCC and the states remove existing legal barriers to entry into the local exchange services market. The report suggested that regulators ensure that

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[34] *Ibid.*, pp. xxii-xxiv and pp. 264-283.

sufficient radio spectrum is available to permit efficient growth of radio-based telecommunications services, such as cellular radio and PCS. The study mentioned that one way to accomplish this would be to create economic and regulatory incentives to encourage radio-based telecommunications users to switch to wire media in congested areas.

The report also recommended that government regulators facilitate competitive entry by mandating that LECs provide efficient interconnection opportunities to other firms that provide local exchange services to the public. The study supported the FCC's rulemaking on local access interconnection with respect to special access services subject to federal jurisdiction and recommended that state commissions continue their innovative proceedings to introduce mandatory local exchange interconnection.

The report suggested that after a reasonable period of initial experimentation with privately negotiated interconnection agreements, regulators should require the tariffing of interconnection agreements in order to facilitate regulatory review and, thus, ease the regulators' task of detecting and remedying unreasonable or discriminatory rates, terms or conditions.

To permit incumbent LECs to respond to the new entrants, and to ensure that entry is economically efficient, NTIA recommended that existing pricing policies be substantially reformed by giving LECs significant pricing flexibility when they face competition. In addition, competitive policies would require a transition to cost-based pricing.

1.6 FCC's Video Dialtone Announcement of October 1991[35]

1.6.1 Background

In addition to the telephone/cable-cross ownership restrictions set forth in Section 613 of the *Cable Communications Policy Act of 1984 (Cable Act)*, Sections 63.54 to 63.58 of the FCC's rules currently make it unlawful for any common carrier to "provide video programming directly to subscribers in its telephone service area."[36] In 1987, the FCC issued a *Notice of Inquiry* seeking comment on whether the original reasons for the cross-ownership restrictions were still valid given technological and market changes that had occurred.[37]

In a *Further Notice of Inquiry and Notice of Proposed Rulemaking (FNOI)* in 1988, the Commission tentatively concluded that it should:

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[35] United States Federal Communications Commission, *Further Notice of Proposed Rulemaking First Report and Order and Second Further Notice of Inquiry (FNPRM)*, adopted October 24, 1991, FCC 91-334 (In the Matter of TELEPHONE COMPANY - CABLE TELEVISION Cross-Ownership Rules, CC Docket No. 87-266), p. 3.

[36] *Ibid.*, p. 3.

[37] *Ibid.*, p. 4.

- recommend to Congress that the cross-ownership ban be repealed or modified to permit the local telephone companies to provide video programming within their service areas subject to Computer III-type safeguards (against possible cross-subsidization of non-regulated activities, and against discrimination).[38]

At the same time, the FCC sought comment on a series of questions including:[39]

- whether the cable cross-ownership ban applied to interexchange carriers; and,

- whether the Cable Act required the telephone common carriers, or customer programmers of such carriers, to obtain a local franchise as a prerequisite to providing such service.

The FNOI in 1988 was followed in October 1991 by the FCC's *Further Notice of Proposed Rulemaking First Report and Order and Second Further Notice of Inquiry* referred to here simply as its video dialtone announcement. The Commission asked for comments on this announcement by January 23, 1992 and replies to comments by February 24, 1992. The document consisted of three parts, each treated separately below:

(1) Further Notice of Proposed Rulemaking;
(2) First Report and Order; and,
(3) Second Further Notice of Inquiry.

1.6.2 Further Notice of Proposed Rulemaking[40]

The FCC tentatively concluded that a "video dialtone" policy would provide the best foundation to achieve its goals of promoting the development of an efficient, nationwide, publicly accessible, advanced telecommunications infrastructure, facilitating robust competition, and fostering the First Amendment goal of ensuring a diversity of information sources.

Video dialtone would be common-carrier-based with the addition of competitive non-common-carrier services that would provide end users with access to video programming and other information sources.

The FCC foresaw video dialtone as analogous to the ordinary telephone dialtone so as to give consumers access to a wide variety of services. These services might include video programming (provided by entities other than the LECs), videotex and videophone, as well as other advanced telecommunications services.

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[38] *Ibid.*, p. 4.

[39] *Ibid.*, p. 4.

[40] *Ibid.*, pp. 5-22.

The FCC tentatively concluded that deployment of video dialtone is permitted under the Cable Act and it examined possible ways in which video dialtone could be implemented.

The FCC further tentatively concluded that a video dialtone approach using a two-level gateway would best serve its objectives. The FCC invited comment on the feasibility of deploying such a system as well as the advantages and disadvantages to the public of so proceeding.

The FCC also examined what changes to its rules might be necessary or desirable for the deployment of video dialtone.

1.6.3 First Report and Order

In this part of the October 1991 statement, the FCC announced its conclusions on two of the questions on which it had sought public comment in the FNOI of 1988. It concluded that:

- the phrase "telephone service area" in the legislation that prescribes the cross-ownership ban, refers to "local exchange service area" and, therefore, the statutory cross-ownership ban is properly interpreted to apply only to LECs within the areas where they own or control facilities that provide exchange service;[41] and

- neither the LEC providing video dialtone services nor its customer-programmer would be required to obtain a cable franchise in order to offer service.[42]

The purpose of announcing these conclusions was "to reduce the uncertainties with respect to the ability of telephone common carriers to proceed with deployment of video dialtone in the future and eliminate disincentives for investment in infrastructure due to ambiguity in statutory interpretation."[43]

1.6.4 Second Further Notice of Inquiry

In this part of the October 1991 announcement, the FCC sought comments on:

- direct provision of video programming by local exchange carriers; and
- investment incentives.

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[41] *Ibid.*, pp. 23-24.
[42] *Ibid.*, pp. 25-26.
[43] *Ibid.*, pp. 22-23.

Direct Provision of Video Programming by Local Exchange Carriers

The FCC referred to its 1988 FNOI in which it had concluded the public interest would best be served by permitting telephone companies to provide video programming directly to consumers. It asked for comment on whether this conclusion was still valid in light of its video dialtone policy.[44]

The FCC asked those submitting comments to consider possible options for LEC participation in video programming, such as permitting the local telephone companies to own a specified percentage of video programming accessible through video dialtone for a limited period of time, subject to future review. Would it be appropriate to permit telephone companies to have a limited interest in video programming offered through the video dialtone?

In addition, parties proposing that telephone companies be permitted to have an interest in video programming were asked to address whether special safeguards would be necessary to protect against cross subsidization. For example, would separate subsidiaries for programming be necessary in order to reduce such risks effectively?

Investment Incentives

The FCC referred to suggestions by some observers that some of the Commission's regulations may thwart, rather than encourage, the development of the infrastructure on which video dialtone service would be built. For example, it had been argued that the FCC's depreciation policies create little incentive for local telephone companies to retire existing copper plant and switches and to replace those facilities with fibre optic cable. However, in the October 1991 announcement, the FCC suggested that with digital compression and other future technological developments, it may not be necessary to replace copper with fibre on an accelerated basis in order to deliver video services over local telephone networks. In this context, the FCC sought comments on whether and what changes in its rules might be needed.[45]

The FCC also asked for observations on whether cooperative investment and construction of broadband facilities by cable and telephone companies should be encouraged, possibly by changes in tax legislation. For instance, should cable operators be permitted to own a percentage of the underlying video dialtone facilities so that they would be able to reap any tax benefits that attach with ownership?[46]

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[44] *Ibid.*, pp. 29-30.

[45] *Ibid.*, pp. 30-31.

[46] *Ibid.*, p. 31.

1.7 Comments Filed in Response to the FCC's Video Dialtone Announcement

In comments filed with the FCC by the deadline of January 23, 1992, the telephone companies in general found the models proposed by the FCC for regulating video dialtone to be too restrictive.[47] In their view, video dialtone is not viable unless telephone companies, themselves, are also allowed to provide video programming directly to consumers. Telephone companies must be permitted to compete in both the transport and creation of video programming.[48] Providing video dialtone alone would not be a large enough incentive to persuade telephone companies to incur increased video network costs. Some telephone industry commenters thought that future networks will not distinguish among voice, data, video and multimedia services and that regulations based on the old distinctions will either delay or preclude the introduction of new services.

Cable operators were clearly opposed to any repeal or loosening of the legislative ban on telephone/cable cross-ownership. They believed that repealing the ban and relying on Computer III-type safeguards would be an unwarranted leap of faith that would result in anti-competitive effects on the entire video market place. Cable operators were also critical of the FCC's interpretive ruling that video dialtone service providers and their customers would be exempt from local cable franchising requirements. Both the NCTA and the CATA have appealed this ruling to the courts.[49]

The Motion Picture Association of America (MPAA) was intrigued by the prospect of a major new distribution medium to the home, but noting that the video programming and telephone industries know very little about each other's businesses, recommended that the FCC establish an advisory committee to make recommendations on the form and substance of video dialtone.[50]

The NAB generally supported the notion of a common-carrier-based video dialtone system as a competitor to existing cable systems, but saw no need to lift the restriction on telephone companies providing programming directly to consumers.[51]

The Consumer Federation of America and the Office of Communication of the United Church for Christ in a joint submission were especially critical of the two-level gateway approach that the FCC had proposed. Their submission argued that allowing the telephone company to be both common carrier and have a financial interest in packages that are sold over the network would create a conflict of interest. In their view, the LECs should be barred from having any financial stake in what services should be selected by consumers, and the ban on telephone companies providing video programming should be maintained.[52]

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[47] "FCC's 'video dial-tone' concept criticized from all sides," *Telecommunications Reports*, February 10, 1992, pp. 27-30 and p. 43.

[48] "Video dialtone falls short for telcos", *Broadcasting*, February 10, 1992, p. 48.

[49] See note 47, pp. 43-44.

[50] *Ibid.*, p. 44.

[51] *Ibid.*, pp. 44-45.

Rand Corporation Senior Economist Leland L. Johnson thought there was no sound basis for singling out LECs for common carrier treatment if they choose to enter the video market. In his opinion, a stronger basis exists for imposing common carrier requirements on cable operators. He believed that LEC integration into programming would not raise a serious threat of cross-subsidization because program production costs are separable from telephone company transmission costs. Johnson considered that cross-subsidization between the video and telephone portions of the network would be more of a problem because of the pervasive elements of common costs within integrated networks. He added that any government regulation of LEC-owned video facilities should be similar to whatever regulatory scheme is in place for cable.[53]

NTIA, in its submission to the FCC, took the position that unless LECs also have the ability to invest in and offer their customers video programming, they may have only limited incentives to deploy video distribution facilities. It urged the Commission to conclude its inquiry promptly and to recommend that Congress repeal the cross-ownership restriction in its entirety, subject to competitive safeguards. NTIA found the FCC's proposed regulatory structure for video dialtone overly detailed, and suggested that more scope should be left to the LECs, their customers and competitors to choose how they will participate in the video services market.[54]

1.8 FCC Recent Action

On July 16, 1992, the FCC announced that it was modifying its rules, enabling local telephone companies (local exchange carriers, or LECs) to provide a video dialtone service. In addition, the Commission recommended that Congress repeal the telco/cable cross-ownership prohibition and proposed expanding the rural area exemption. The action by the Commission (Docket 87-266), adopted at its July 16 meeting, also permits LEC ownership (to a maximum of 5%) in video programmers.

With the modified rules. the LECs will be permitted to act as carriers for video programming provided by others, subject to current rules for enhanced telephone services. The amendment to the rural exemption in its cross-ownership rules will permit LECs to provide video programming directly to areas with a population of less than 10,000. The *Cable Act of 1984* authorized the Commission to define areas for such exemption, and previously the rules had defined rural areas as being communities of under 2500.

The Commission will prohibit LECs from purchasing existing broadband cable television facilities in their service areas in order to provide video dialtone service. However, telco acquisition of existing broadband facilities for leaseback purposes would still be permitted. In a statement on July 16 regarding the "Video Dialtone" Proceeding, Chairman Sikes stated that he hoped the action would not only result in a video dialtone network but would also generate widely based video distribution competition. The FCC proposes to review the modified rules in three years time.

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[52] *Ibid.*

[53] *Ibid.*

[54] *Ibid.*

1.9 Conclusion

In addition to the geographic proximity of the U.S. to Canada, the two countries' telecommunications and cable television industries share many similarities. It is, therefore, not surprising that trends evident south of the border often appear in Canada as well. In the U.S., some major players in both the cable and the telecommunications industries are beginning to form partnerships for certain purposes. For example, AT&T, US West and TCI will conduct digital service market tests outside Denver during the summer of 1992.[55]. It would not be surprising if partnerships of a similar nature were to emerge in Canada.

2.0 LOCAL NETWORKS CONVERGENCE IN THE UNITED KINGDOM

2.1 Introduction

Under the broadcasting and telecommunications regimes in the U.K., two licences are generally required before entertainment services can be offered locally to residential customers -- a Broadcasting Act licence to *provide* the service, i.e. to prepare programs assembled and packaged into channels with a view to having them delivered by cable or microwave radio to people in their homes, and a Telecommunications Act licence to *convey* the relevant signals to customers.[56]

The licences granted to the public telecommunications operators (PTOs) under the *Telecommunications Act* have specifically prevented these operators from *conveying in their own right* entertainment services to residential customers (the conveyance of signals within the network and to business customers is, however, permitted).[57] The Government also has had the power under the *Broadcasting Act* to prevent national PTOs, their parent companies, subsidiaries or associates from holding a licence to *provide* such services.[58]

During the 1980s, while some cable franchises were awarded, the practical difficulties and expense of building a cable system deterred many of the franchisees so that several systems were never started while others only developed very slowly. Renewed interest in cable developed in

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[55] "Technology Key to Bright Cable Future", *Broadcasting*, May 11, 1992, p. 16.

[56] *Competition and Choice, Telecommunications Policy for the 1990s*, presented to Parliament by the Secretary of State for Trade & Industry, March 1991, CM 1461, London: HMSO, p. 25.

[57] *Ibid.*

[58] *Ibid.*

1988, led in part by North American cable and telecommunications companies and in part by Government proposals, in the November 1988 Broadcasting White Paper, for a new local delivery service regime involving the award of franchises by competitive tender. As a result of this renewed interest, franchises were awarded in July 1990, covering nearly 70% of the U.K. population, but, in most cases, the actual building of these franchises systems did not begin immediately.

Between November 1990 and March 1991, the Government conducted a major public review of telecommunications policy and the results of this review had important implications for the question of local networks convergence in that country.

In November 1990, the Government announced its proposals for future telecommunications policy in a Consultative Document entitled *Competition and Choice: Telecommunications Policy for the 1990s*. This marked the formal start of the review of the duopoly policy under which the Government had given a commitment in 1983 not to license, for a period of seven years, companies other than British Telecommunications plc (BT) and Mercury Communications Ltd. (Mercury) to carry telecommunications services over fixed links. The document invited comments on the Government's future telecommunications policy, including the licensing of new operators, and a number of inter-related issues falling within the responsibility of the Director General of Telecommunications (the Director General).

After examining the over 200 written responses to the November proposals, the Government issued a White Paper in March 1991 setting out its and the Director General's conclusions. The March White Paper carries the same title as the November document: *Competition and Choice: Telecommunications Policy for the 1990s*.

2.2 March 1991 White Paper

Summarized below are the conclusions reached in the White Paper regarding, on the one hand, telephone company entry into the delivery of video programming and, on the other hand, cable company entry into telephony.

2.2.1 Telephone Company Entry into Delivery of Video Programming

British Telecommunications plc, other national public telecommunications operators and Kingston Communications will continue to be prevented from conveying entertainment services in their own right for 10 years.[59]

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[59] *Ibid.*, p. 26.

The Government would be prepared to reconsider this 10-year restriction after seven years if the Director General of Telecommunications advised that removing the restriction would be likely to promote more effective competition in telecommunications.[60]

Any applications from new network operators for licences to offer telecommunications services may include proposals for carrying entertainment services. Such licences will not, however, permit the running of satellite master antenna television (SMATV) systems that do not require a licence under the *Broadcasting Act*. (The recently established regime for such systems gives cable operators the right of first refusal to provide an alternative service for any proposed systems within their franchise area.)[61]

The Government intends to allow the parents, subsidiaries and associates of national PTOs, but not such operators themselves (except in areas where no cable franchise has been granted), to tender for any local delivery franchise advertised by the Independent Television Commission, including any over-franchising of present cable areas.[62]

The Government intends, after April 1, 1994, to allow the national PTOs to tender in their own right for a local delivery service licence for any part of the country not at that time covered by a cable or local delivery licence.[63]

The Government intends not to allow the national PTOs to provide entertainment services nationally in their own right. This policy will not be reviewed for at least the next 10 years. Thereafter the Government would expect only to review it if the Director General advised that a change of policy would be likely to lead to more effective competition in telecommunications.[64]

2.2.2 Cable Company Entry into Telephony

If requested by a cable operator to do so, the Director General is prepared to undertake the necessary statutory consultation with a view to modifying its licence to remove the requirement on the operator to provide voice telephony services only in conjunction with BT or Mercury Communications. He is also prepared to consider a similar amendment in respect of data services in those areas of London, Birmingham and Manchester where the provision of such services is subject to the same restriction.[65]

If requested by a cable operator to do so, the Director General is prepared to undertake the necessary statutory consultation with a view to modifying its licence to release the operator from the requirement to obtain a determination from the Director General before it can offer voice telephony services and to authorize it to provide such services subject to certain conditions.[66]

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[60] *Ibid.*

[61] *Ibid.*

[62] *Ibid.*, p. 29.

[63] *Ibid.*

[64] *Ibid.*

[65] *Ibid.*

The Government will in future allow the operators of any adjacent cable franchises to interconnect their systems in their own right. Applications for licences to run links between distant franchises will be considered on the same basis as other applications for licences.[67]

2.2.3 Analysis of the Situation in the United Kingdom

Before the 1991 White Paper was issued, at least one commentator, Sally Davis, noted that under the duopoly policy adopted in 1983, BT had remained the dominant player vis-à-vis Mercury Communications.[68] The cable companies, for their part, under regulations since 1983 had been left in weak bargaining positions with the duopolists, resulting in ineffective relationships and poor margins, insufficient for viable entry into the telephone business.[69] In Davis' view, the playing field under the 1983 policy should have been tipped in favour of new entrants to enable them to combat the dominance of existing players.[70]

Before offering telephony, a cable operator had to seek, and reach, an agreement on terms and conditions with one of the two duopoly operators, neither of whom was obliged to reach such an agreement.[71] Since BT was not enthusiastic about helping a direct competitor operate in its local networks, the cooperation of Mercury Communications proved essential in enabling the cable industry to participate at all in the telecommunications market.[72] The pre-1991 regulatory structure meant that cable operators were not in a strong bargaining position and were forced to negotiate on the terms established by the PTO.[73] As a result, interconnect agreements established with Mercury left little more than 10% to 15% of call charge revenues with the cable operator, which was not sufficient for a viable business.[74]

Sally Davis expressed the view in June 1991[75] that the March White Paper had addressed many of cable's concerns. Cable was now seen as a major competitor in the local loop and was in a stronger position for attracting serious investors who are, in fact, making commitments to building new plant.

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[66] *Ibid.*

[67] *Ibid.*, p. 21.

[68] Sally Davis, "New entrants should be favoured," *Cable and Satellite Europe*, June 1990, p. 44.

[69] *Ibid.*

[70] *Ibid.*

[71] *Ibid.*

[72] *Ibid.*

[73] *Ibid.*

[74] *Ibid.*

[75] Sally Davis expressed these views in a telephone conversation with a Canadian Department of Communications official in June 1991.

However, Ms. Davis qualified her remarks by noting that there remain certain difficult economic issues relating to BT's tariffs and interconnection.

By late 1991, there were signs that cable companies in the U.K. were taking advantage of their new freedoms to provide telecommunications services: six cable operators with 15 franchises were supplying such services to about 17,000 customers.[76] One forecast, published by a consulting group, predicted that 400,000 customers would buy telecommunications services from their cable company by 1995.[77]

2.3 Conclusion

Compared to the situation in Canada, cable penetration in the U.K. is very limited. This important difference means that policies adopted in the U.K. would likely be inappropriate to the Canadian environment.

3.0 LOCAL NETWORKS CONVERGENCE IN JAPAN

3.1 Television Signals Available Off-air from Terrestrial Transmitters

Donald R. Browne, in comparing broadcasting systems in six industrialized nations, indicates that most communities in Japan have access to seven television channels available off-air from local transmitters.[78] Two of the seven are provided by Japan's public broadcaster, NHK, one being a general service and the other educational. The five other channels are each provided by one of Japan's five major commercial television broadcasters. NHK's services are supported by receiver licence fees while the commercial stations are supported by advertising revenues.

3.2 Direct Broadcast Satellites

In the 1970's, NHK and Japan's Ministry of Posts and Telecommunications (MPT) began to cooperate in the development of direct broadcast satellites (DBS). This led to the launching of the BS2-a satellite in 1984, by which NHK was able to extend its geographical coverage to the 440,000 households that had been beyond the reach of the public broadcaster's terrestrial signals.[79]

In 1987, NHK began to use the satellite for two special services, the first an amalgam of NHK's general and educational terrestrial services, the second a combination of sports, entertainment and news drawn from the U.S. Cable News Network (CNN) and ABC network, BBC and other foreign and Japanese sources.[80] These two NHK satellite channels are supported by supplementary receiver licence fees paid by those who have the equipment necessary to receive these DBS channels. By July 1991, the number of homes with DBS receivers had grown to 4 million.[81]

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[76] J.C. Barry, "U.K. Telecommunications Liberalization: A Review and Progress Report," *Regulatory Research*, Bell Canada, January 24, 1992, p. 23.

[77] *Ibid.*

[78] Donald R. Browne, "Japan: From Kabuki to Crime Drama," in his *Comparing Broadcast Systems: The Experiences of Six Industrialized Nations* (Ames: Iowa State University Press, 1989), pp. 303-355.

[79] Roya Akhavan-Majid, "DBS Policymaking in Japan: An interpretive history," *Telecommunications Policy*, December 1989, p. 365.

The publicly supported BS series of satellites continued, after BS2-a, with the launch of BS-3a, the first of the next generation of more powerful BS-3 satellites. In addition to carrying the two NHK DBS services, BS-3a began in November 1990 to carry a new commercial DBS service operated by a broadly-based, private-sector consortium, Japan Satellite Broadcasting (JSB). The JSB service, known as "Wowow", offers mainly films and sports. Initially offered on an experimental basis, JSB began encrypting its signal at the beginning of April 1991. Subscriptions by early May had already reached 340,000, over twice as many as had been expected by that time.[82]

The BS satellite series has also been used to promote Japan's high-definition television HDTV format "Hi-Vision". Using the BS-2a satellite, NHK began in 1989 to transmit an hour a day in the Hi-Vision format using the MUSE compression system.[83] BS-3b was launched in August 1991, in time for "Hi-Vision Day" November 25, 1991 when full channel Hi-Vision service began, with 1125 corresponding to the number of lines in the Hi-Vision screen. The new full channel service is operated by the Hi-Vision Promotion Association, an independent body in which NHK has a strong, but not controlling role.[84] The BS-3b satellite also provides back-up for the NHK and JSB regular DBS services on BS-3a.[85]

3.3 Cable Television

Cable television began in Japan in the 1950's as a means of extending television coverage into mountainous areas. Each cable system generally had only a few hundred subscribers and most of the systems were operated on a non-profit basis. This has continued to be the pattern in many areas.

In a study done in 1990 for Harvard University's Program on Information Resources Policy, Naoyuki Koike found that Japan's cable television industry was "still in its infancy."[86]

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[80] See note 78, p. 353.

[81] Mark Schilling, "Even in Japan," *Cable and Satellite Europe*, July 1991, p. 30.

[82] Simon Baker and Mark Schilling, "Challenging the DBS jinx," *Cable and Satellite Europe*, June 1991, p. 29.

[83] Simon Baker, "High Noon for Hi-Vision," *Cable and Satellite Europe*, October 1989, p. 38.

[84] Mark Schilling, "Hi, but above all, wide," *Cable and Satellite Europe*, January 1992, p. 34.

[85] *Ibid.*, p. 34.

[86] Naoyuki Koike, *Cable Television and Telephone Companies: Towards Residential Broadband Communications Services in the United States and Japan*, Program on Information Resources Policy, Center for Information Policy Research Harvard University, Cambridge, Massachusetts,

According to the most recent figures available (1989-90 fiscal year), 18.6% (6.2 million) of Japanese households are passed by cable, up by 1.9 million from the 1984-85 figure of 4.3 million.[87] Of the 45,000 cable systems in the country, 98% of them have fewer than 500 subscribers each. Moreover, most systems have only a seven-channel capacity.[88]

Nevertheless, construction of larger-scale systems with two-way capability and more channel capacity has been under way in recent years in urban areas. A leading "urban type" cable company, Tokyo Cable Network, was operating in Tokyo's Bunkyo ward in 1991 and had plans to extend into the Arakawa area. By July 1991, this company had achieved a subscriber penetration rate of 11,500 subscribers, amounting to better than 8% of the 140,000 television households in Bunkyo and Arakawa combined.[89] This 8% is much better than the industry average of 3%.[90] Because of MPT licensing restrictions, the company is confined to its franchise area and cannot link with other cable operators to negotiate contracts with program suppliers.

There are reported to be about 18 channels of special programming available for carriage on cable systems.[91] The first few of these programming services began in 1989.[92] They are carried on private-sector satellites, owned by Space Communications Corporation (SCC) and Japan Communications Satellite Company Inc. (JC Sat). However, compared to their North American counterparts, Japan's satellite-to-cable programming services are generally small-scale, underfunded operations that are hard pressed to compete with the DBS and terrestrial over-the-air services.[93]

3.4 Telecommunications

In 1952, NTT was established and granted a legal monopoly on domestic telecommunications. NTT was modeled after AT&T in the United States, but was not vertically integrated into equipment manufacturing. Shortly after NTT was formed, the Kokusai Denshin Denwa Company Ltd. (KDD) was established as a special company for providing international

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December 1990, p. 133.

[87] Susumu Yoshida and Takashi Ohtsuka, "Progress of CATV in Japan," *Symposium Record: Cable TV Sessions*, Paper presented at 17th International Television Symposium and Technical Exhibition, Montreux, Switzerland, June 13-18, 1991, p. 31. Complemented by additional information provided in correspondence dated July 31, 1991, received from Kenkichi Yamamoto, Senior Researcher, NHK Research Institute.

[88] See note 86, p. 30.

[89] Schilling, "Even in Japan," *Cable and Satellite Europe*, July 1991, p. 28. Complemented by additional information provided in correspondence dated July 31, 1991, received from Kenkichi Yamamoto, Senior Researcher, NHK Research Institute.

[90] See note 81, p. 28.

[91] *Ibid.*

[92] Mark Schilling, "Made in the U.S.A.," *Cable and Satellite Europe*, October 1989, p. 44.

[93] See note 81, p. 30.

telecommunications services.[94] Pressures in the early 1980s, to open up the respective monopolies enjoyed by NTT and KDD, led to important reforms adopted by the Diet (Japanese legislature). These took effect in 1985.[95]

The new legislation provided for the privatization of NTT, but the idea of breaking it up was ruled out, at least until after a review of the question scheduled for 1990.[96] (This review, which has since occurred, reached the conclusion that the issue of NTT break-up should be reviewed again in 1995.)[97] Under the 1985 legislation, NTT was given the freedom to enter new lines of business. Its previous investment restrictions were lifted and its budget was no longer controlled by the Diet. Its business plans, rates and other conditions of service remained under MPT's control. The newly privatized NTT was initially owned 100% by the Government, but the Government was allowed to sell up to 2/3 of its holdings. After three offerings of shares since 1985, about 1/3 of NTT's shares are now held by the public. The sales of these netted the Government close to $75 billion (U.S.). Foreign ownership of NTT shares is not permitted.[98]

The 1985 package of reforms also included provisions that allow new entrants to compete in providing local, toll, and international facilities and services. Among these new entrants have been those that are facilities-based (Type I, the so-called "new common carriers"). The other entrants (Type II carriers) are those that compete in the provision of telecommunications services, but do not themselves have their own circuit facilities.[99]

In spite of the liberalization that took effect in 1985, NTT still cannot provide cable facilities nor can it act as a cable operator. While not completely clear, it seems likely that any new common carrier that formally applied to enter the cable business would be denied entry.[100]

NTT had announced plans to construct a broadband ISDN network based on optical fibres, beginning in 1995, with nationwide coverage by 2015.[101] However, recent statements from NTT indicate that, due to the current economy and uncertain customer demand, the company now considers the goal of completing a fibre network by 2015 as no longer realistic.

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[94] J.C. Barry, "Telecommunications in Japan: Background and Current Status," *Regulatory Research*, Bell Canada, May 27, 1991, p. 1.

[95] *Ibid.*, pp.3-5.

[96] *Ibid.*, pp. 5-6.

[97] *Ibid.*, pp. 16-17.

[98] *Ibid.*, p. 6.

[99] *Ibid.*, pp. 6-8.

[100] See note 86, pp. 42-45 and pp. 109-110.

[101] Michael Galbraith, "Japan thinks big on the fiber front," *Telephony*, May 6, 1991, pp. 34-38.

3.5 Conclusion

One might conclude that in Japan, DBS is likely to be the preferred method of delivery of new television programming services over at least the next decade, after which NTT's broadband ISDN network will start to take shape. Cable television may be left behind in this process.

4.0 POLICY PROPOSALS ON CONVERGENCE BY THE ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT

4.1 Overview

The Organisation for Economic Cooperation and Development (OECD) Directorate for Science, Technology and Industry (DSTI)'s Committee for Information, Computer and Communications Policy (CICCP) began a project in 1990 on the policy implications of convergence between communications technologies, specifically between telecommunications and broadcasting. This project resulted in the production of a paper entitled *Convergence Between Communications Technologies: A Policy Review* [ICCP 29 (forthcoming)]. Some important elements of this paper are summarized below.

4.2 Policy Review

4.2.1 Introduction

The CICCP paper noted that the three strands of the information industry -- computing, communications and broadcasting -- have evolved historically as separate sectors, but conventionally understood boundaries between them are now blurring as these sectors mature.[102]

The paper argues that the technical convergence between computing and telecommunications is well-documented and, even if the process is taking longer than expected, it has already been widely anticipated through structural changes in policy administration and corporate organisation.[103]

According to the document, the convergence between telecommunications and broadcasting is less well-publicised, but will have far-reaching implications. It claims the boundaries between the two are largely artificial, since they are delineated by regulation rather than by the technology itself. As a result, the document suggests it is policy makers who have the power to define or foreclose emerging market opportunities.[104]

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[102] Organisation for Economic Co-operation and Development, *Convergence Between Communications Technologies: A Policy Review* ICCP 29 (forthcoming) p. 6.

[103] *Ibid.*

[104] *Ibid.*, p. 6.

4.2.2 Evidence of Convergence

The report notes that convergence is taking place through three main processes -- technical, functional and corporate.

Looking at the technical process, the document concludes that once digital information flow is possible between the communications media and terminal equipment of each of the computing, telecommunications and broadcasting industries, it will no longer be relevant to treat them as separate sectors.[105]

Functional convergence refers to the development of new "hybrid" services. The convention that broadcasting is used exclusively for education and entertainment while telecommunications is used for business and social purposes no longer holds true. The technical capabilities offered by future networks, based around the use of fibre optic technology, demand an increasing integration of voice, text, data and image if they are to be used to their full potential.[106]

Service operators in broadcasting have traditionally been funded by indirect means such as advertising, licence fee collection or direct government subsidy, whereas telecommunications operators have charged the customer directly for the services consumed. The document points out that in fact, both types of organisation now draw their revenues from a wider base of funding sources. However, it argues that corporate convergence is more likely to come from equipment manufacturers than from service providers because manufacturers have more to gain from the development of new markets, notably for HDTV.[107]

4.2.3 Investment Strategies in OECD Countries

In examining investment in telecommunications networks in OECD countries, the report notes it is possible to pick out four particular groups of countries:

- *Above average investment per line and above average growth in lines*: those countries which have set out to provide basic universal service and have benefited from a corresponding growth in revenues. These countries include Spain, Italy, Portugal, Ireland and Norway.

- *Below average investment per line but above average growth in lines*: countries which continue to experience a strong demand for network expansion, but have been unable to match investment levels in other OECD countries. These countries include Turkey, Greece and Belgium. In the case of France, rapid expansion was achieved in the 1970s and early 1980s and investment levels have subsequently been reduced.

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[105] *Ibid.*, pp. 6 and 13-28.
[106] *Ibid.*, pp. 6 and 29-42.
[107] *Ibid.*, pp. 6 and 43-54.

- *Below average investment per line and above average density of main lines*: countries which have a relatively "mature" telecommunications infrastructure such as the U.S., Sweden or Denmark. In these countries, there has generally been a shift of investment away from the public network to private networks.

- *Above average investment per line and above average density of main lines*: countries which have also reached a high level of maturity, but which are continuing to invest heavily in network modernisation and digitisation. These countries include Switzerland, Japan, Austria and Germany.[108]

4.2.4 Supply-Led Investment Strategies

The fourth category of countries, with their continued high investment in public networks can be said to have adopted a "supply-led" strategy. These countries continue to be the most committed to the implementation of an Integrated Services Digital Network (ISDN) strategy and they have pursued investment strategies designed to anticipate demand rather than respond to it. The private networking sector is generally poorly developed in these countries, partly because of relatively high tariffs for leased lines, but also because of the prevailing philosophy that telecommunications should be a publicly provided service.[109]

An example of a supply-led investment strategy is provided by Japan. NTT envisages an orderly transition from the current public switched telephone network with the phasing out of analogue crossbar switches by 1995, and the digitisation of all remaining switches by 1999. By the turn of the century, therefore, NTT plans to be able to provide a standardised, digital narrowband ISDN interface through the country.[110]

In 1995, NTT plans to begin constructing a broadband ISDN network based on optical fibres for nationwide coverage by 2015. NTT foresees three main demand-drivers: (1) telephony, (2) text mail and (3) video-telephony, and plans to provide these one-to-one, interactive communications services uniformly throughout the country.[111]

The OECD document suggests that perhaps the most surprising aspect of this vision is the intention to provide video-telephony as a universal service to Japanese homes with an anticipated 20 million units in operation by 2015. The OECD paper notes that other public carriers appear to have rejected video-telephony as a viable commercial service, preferring to focus instead on video-conferencing and to look to other services, such as video-on-demand or HDTV, as possible broadband demand-drivers.[112]

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[108] *Ibid.*, p. 59.

[109] *Ibid.*, p. 59.

[110] *Ibid.*, p. 60.

[111] *Ibid.*, p. 60.

4.2.5 Demand-Led Investment Strategies

Countries in the third of the four investment strategy categories described above profess to be following a "demand-led" investment strategy. In these countries, investment planning is a response to demonstrable user demand rather than an anticipation of future demand. The OECD document suggests that the danger here is that users only ask for more of what they already have and rarely ask for completely new services. Which comes first: the network? or the services? The document calls for a balance between a demand-led and a supply-led strategy. It notes the important shift that has occurred in the third category of countries from public to private network expenditure. It cautions that while countries which adopt a demand-led strategy claim to reap benefits from closer attention to user demand, there remains the danger that no long-term policy vision will emerge and development will be piecemeal and uncoordinated.[113]

4.2.6 "A 1990s Vision of Network Evolution Towards Diversity"

The OECD document says that as recently as five years ago, it was possible to build a model of the evolution of the telecommunications and broadcast infrastructure which showed an inevitable convergence towards an integrated broadband communications network.[114] A copy of such a model from the document is presented in Figure 1: "A 1980s Vision of Network Evolution Towards Integration".[115]

The OECD document argues that such a tidy model is no longer realistic because of trends in the last five years.[116] To accommodate these trends, the document puts forward "A 1990s Vision of Network Evolution Towards Diversity."[117] A copy of this model is presented in Figure 2: "A 1990s Vision of Network Evolution Towards Diversity". This new model assumes:[118]

- multiple network providers competing on the basis of alternative technologies (e.g. twisted pair, coaxial cable, fibre, radio, satellite, and hybrids);
- demand-driven investment based on "personal" voice, fax and entertainment services;

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[112] *Ibid.*, p. 60.
[113] *Ibid.*, pp. 60 and 64.
[114] *Ibid.*, p. 64.
[115] *Ibid.*, p. 62.
[116] *Ibid.*, pp. 64-65.
[117] *Ibid.*, p. 63.
[118] *Ibid.*, p. 65.

Figure 1

A 1980s Vision of Network Evolution Towards Integration

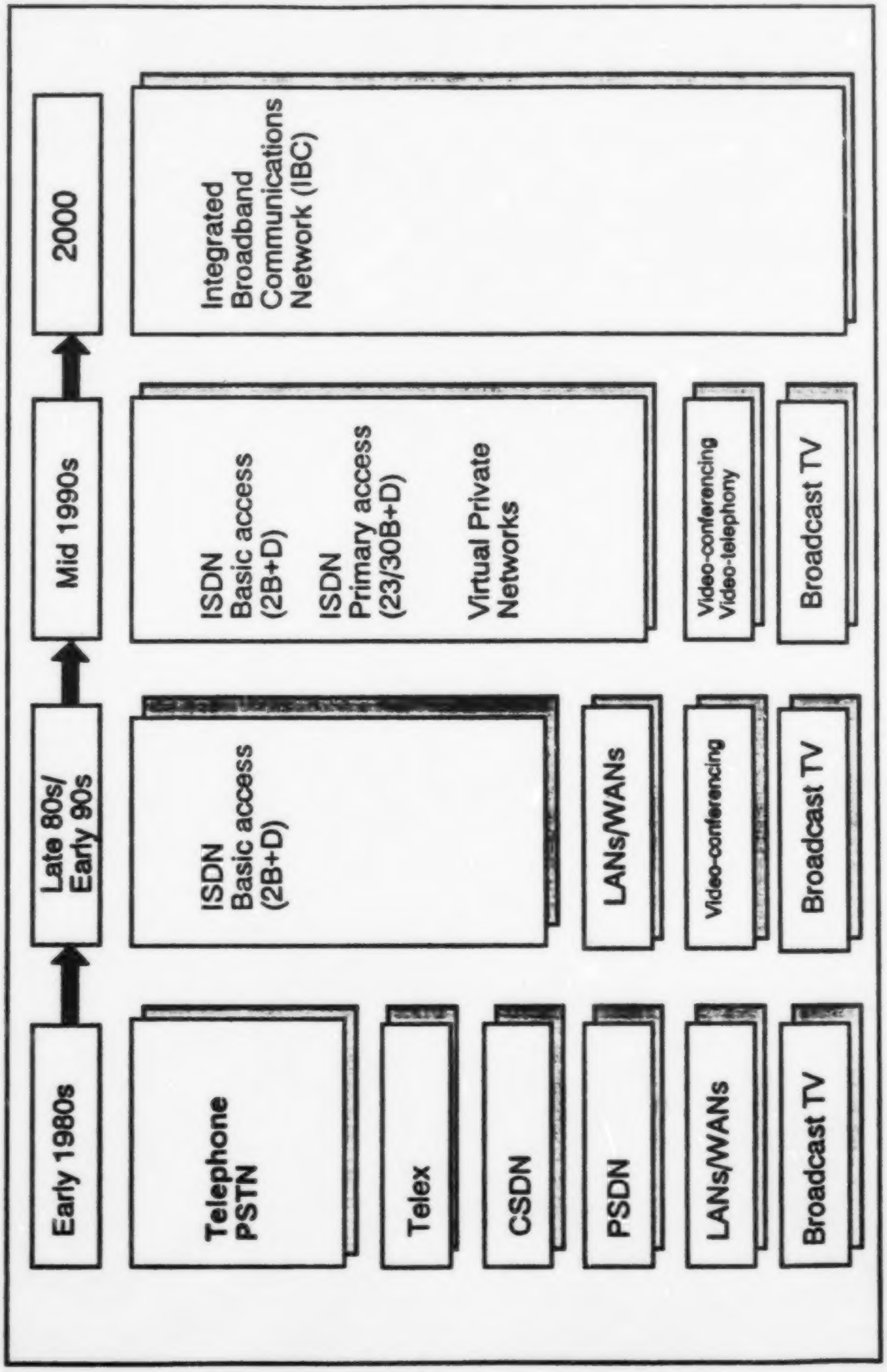
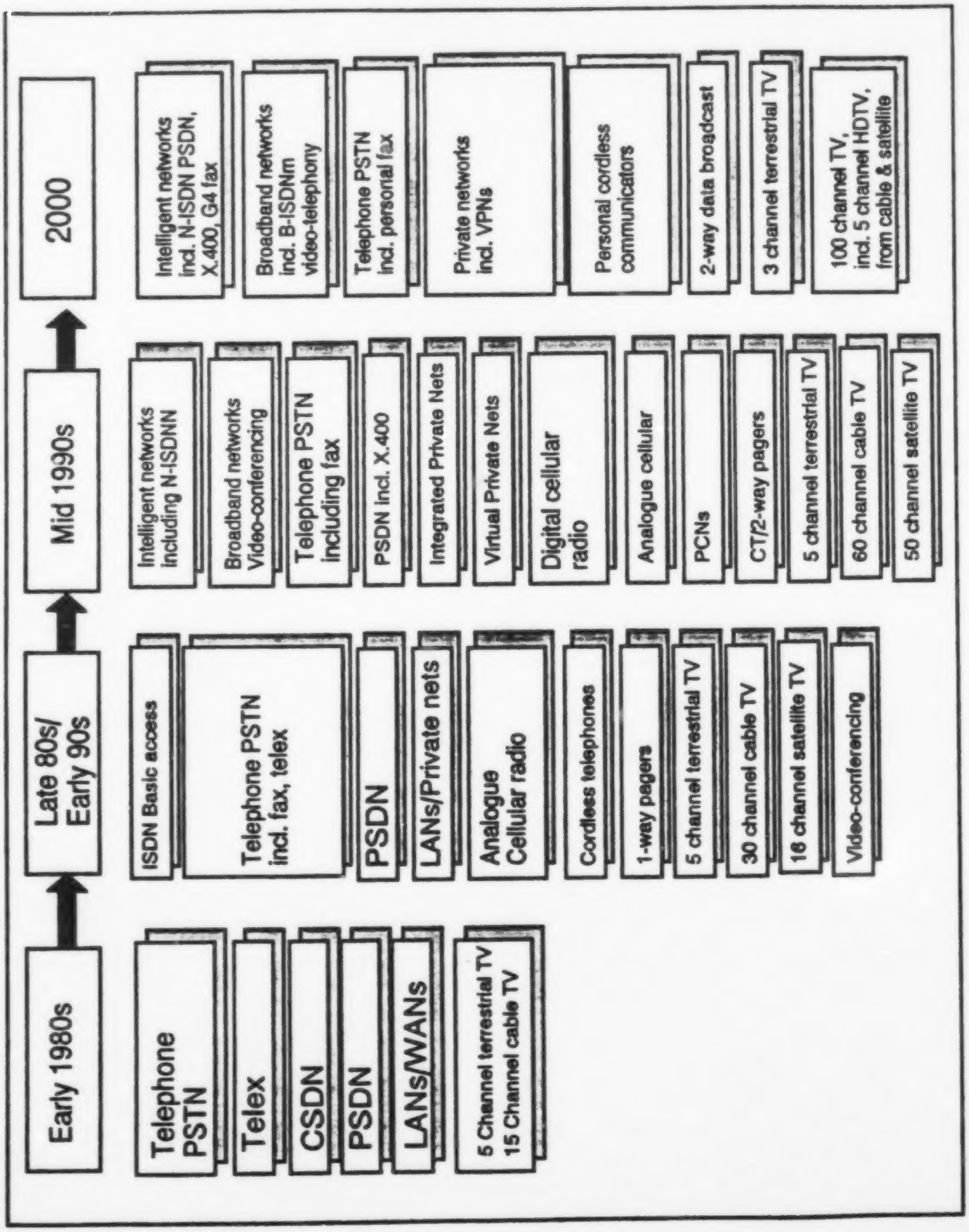

Early 1980s
Telephone PSTN
Telex
CSDN
PSDN
LANs/WANs
Broadcast TV
Late 80s/ Early 90s
ISDN Basic access (2B+D)
LANs/WANs
Video-conferencing
Broadcast TV
Mid 1990s
ISDN Basic access (2B+D)
ISDN Primary access (23/30B+D)
Virtual Private Networks
Video-conferencing Video-telephony
Broadcast TV
2000
Integrated Broadband Communications Network (IBC)

Figure 2

A 1990s Vision of Network Evolution Towards Diversity


Early 1980s
Telephone PSTN
Telex
CSDN
PSDN
LANs/WANs
5 Channel terrestrial TV 15 Channel cable TV
Late 80s/ Early 90s
ISDN Basic access
Telephone PSTN incl. fax, telex
PSDN
LANs/Private nets
Analogue Cellular radio
Cordless telephones
1-way pagers
5 channel terrestrial TV
30 channel cable TV
16 channel satellite TV
Video-conferencing
Mid 1990s
Intelligent networks including N-ISDNN
Broadband networks Video-conferencing
Telephone PSTN including fax
PSDN incl. X.400
Integrated Private Nets
Virtual Private Nets
Digital cellular radio
Analogue cellular
PCNs
CT/2-way pagers
5 channel terrestrial TV
60 channel cable TV
50 channel satellite TV
2000
Intelligent networks incl. N-ISDN PSDN, X.400, G4 fax
Broadband networks incl. B-ISDNm video-telephony
Telephone PSTN incl. personal fax
Private networks incl. VPNs
Personal cordless communicators
2-way data broadcast
3 channel terrestrial TV
100 channel TV, incl. 5 channel HDTV, from cable & satellite

- dilution of service revenues between transmission media in the context of an enlarged total market;
- divergence of residential and business requirements and continuing separation of telecommunications and television infrastructures; and
- continuity of "obsolete" services which compete against newer technologies on price and reliability and trickle down to the small firm/residential market.

The model involves a high degree of overlap and duplication, but also, crucially, more competition both between alternative transmission media and between competing network providers. It is probably less efficient in terms of investment strategy, but it does imply more choice for users, including tariff choice.[119]

At the heart of this concept is the idea of telecommunications as a "personal" service in the same way that computing has become a personal resource. Voice communications continues to be the main demand-driver followed by personal fax and multi-channel TV. Business communications will increasingly be met by integrated private networks and third-party service providers offering virtual private networks. Analogue communications will continue to thrive, especially for voice telephony and conventional TV broadcasting. Digital communications will grow in importance for business users, for mobile communications, for HDTV and for other services where data compression is essential.[120]

4.3 Conclusions and Proposals

The CICCP background document argues that it is not so necessary for regulators to keep telecommunications and broadcasting networks structurally separated.[121] It suggests that, indeed, there are strong arguments in favour of allowing network sharing on the grounds of technical and environmental efficiency.[122]

The document claims there are few remaining arguments in favour of the continuing separation of telecommunications and broadcasting services.[123] It notes there is no real pressure from service providers at present to allow cross-sectoral provision of services, but equally, there is no compelling reason to disallow it.[124] It is argued that regulators should seek a new role in policing access to, and interconnection of, public networks.[125] The report makes the following eight[126] policy proposals for the regulation of networks and services under "convergence":

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[119] *Ibid.*, p. 65.

[120] *Ibid.*, p. 65.

[121] *Ibid.*, p. 7.

[122] *Ibid.*, p. 7

[123] *Ibid.*, p. 7

[124] *Ibid.*, p. 7.

- Restrictions on cross-provision should be strictly limited to firms with an actual or potential dominant market position.
- Restrictions on cross-ownership should only be considered for acquisitions by firms with an existing dominant market position.
- Network sharing should be promoted where it creates new services or provides new investment which would not otherwise exist.
- Sharing of network facilities and support services should be actively encouraged where it leads to reduced costs and greater environmental efficiency.
- Policy makers should not attempt to specify a minimum viable scale for market players.
- Regulators should move towards a market mechanism for allocating the civil radio frequency spectrum.
- Licences for carriers and service providers should not specify what technology or mode of delivery should be used.
- Regulators should be principally concerned with issues of access to, and interconnection of, networks and services.

5.0 EUROPEAN COMMUNITY POLICY ON CONVERGENCE

5.1 General Comments

In the past, comparative policy information from within Europe has usually been derived from individual Member States. With the arrival of 1992, however, it becomes more appropriate to examine European policies within the framework of a united Europe. On February 7, 1992, the twelve[127] member states of the European Community reconfirmed their desire for a cohesive economic, social and foreign policy union in the "Treaty on European Union", signed in Maastricht. Concerning telecommunications, title XII reiterates the goal of common trans-

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[125] *Ibid.*, p. 7.

[126] *Ibid.*, pp. 7 and 95-100.

[127] Belgium, Denmark, the Federal Republic of Germany, the French Republic, the Hellenic Republic (Greece), Ireland, the Italian Republic, Luxembourg, the Netherlands, the Portuguese Republic, the United Kingdom of Great Britain and Northern Ireland, and Spain.

European networks, including provisions "to cooperate with third countries to promote projects of mutual interest and to ensure the inter-operability of the networks"(Art. 129d). For the first time this agreement contained provisions for culture and made recommendations to strengthen European culture.

Although a specific convergence directive or resolution has not been issued by the European Commission, the Group for Analysis and Forecasting (GAP) has identified the need for "joint provision of video communications and TV distribution via a single local network if acceptable tariff levels are to be reached".[128] As well, the RACE programme is working to encourage broadband capability that will integrate two-way narrowband telephone and data and one-way broadband television.

Television, film and video companies are interested in the role of European telecommunications in cable television and ISDN technology. There are no regulations in place that would apply a pan-European approach to convergence. In the absence of a general policy, telecommunications regulations take priority over broadcast regulations. The relationship between the telecommunications and cable television sectors varies significantly between countries.

5.2 Ownership Rules

Generally speaking, Articles 85 and 86 of the Treaty of Rome give the Commission the power to curb monopoly organizations, and issue directives which are binding on member states without their prior consultation. In the area of the media, with growing numbers of mergers and acquisitions, the Commission wants pre-emptive powers to regulate media mergers. The Commission has proposed a new "Regulation on the Control of Concentration between Undertakings" which would give it the power to intervene in the following situations:

- the undertakings involved have a combined turnover initially set at 5,000 million European Currency Units (approximately US$6.18 billion); and
- two thirds of the combined group's sales are in one Member State.

The Commission will allow monopolistic or anti-competitive mergers if their economic benefits outweigh the damage to competition. The Commission is promoting media concentration and convergence in order to create strong European firms able to compete internationally with the US, Japanese or Australian entities.[129] One could surmise therefore that there is an indirect effort to create a fortified European communications industry and that the interest in permitting mergers in the media sector would imply a green light for broadcast/telephone company convergence provided that it is in accordance with Articles 85 and 86 of the base Treaty and does not encourage a dominant market position. In this respect the Commission will consider the following criteria:

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[128] Proposals by GAP for the coordinated introduction of broadband communications in the Community, 1986, cited in *Telecommunications in Europe*, Herbert Ungerer (Brussels: Commission of the European Communities, 1990), p. 76.

[129] Michael Foster and John Howkins, *Television in 1992: A guide to Europe's New TV, Film and Video Business* (London: Coopers and Lybrand, 1989), p. 53.

- the market share of the companies concerned;
- their "economic and financial power" (ability to control price);
- the extent to which they have exclusive access to suppliers or markets;
- the extent and structure of international competition;
- barriers to entry; and
- supply and demand trends in the communications industry.

6.0 IMPACT OF CONVERGENCE ON THE INTERNATIONAL TELECOMMUNICATION UNION

The convergence of broadcasting and telecommunications is one of a few key factors that has led to the complete restructuring of the International Telecommunication Union in 1991-92. The High Level Committee (HLC), chaired by G.I. Warren of Canada notes that:

> . . . one of the most dynamic forces for change is the convergence of telecommunications, computer, broadcasting and information technologies to create an expanding number of new value-added and integrated communication services. This has created a demand for open global networks capable of simultaneously transmitting voice, data and images to multi-purpose terminals."[130]

In the past those divisions mandated to deal with telecommunications, the International Telegraph and Telephone Consultative Committee (CCITT),[131] and radio broadcast communications, the International Radio Consultative Committee (CCIR), were separate. H.L.C. recommendations that are to be approved in December 1992 would mould these functions as the Standardization Sector. The newly created Strategic Policy and Planning Unit has been charged with gauging developments in the area of convergence to ensure that the international regulatory framework is appropriate.

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[130] High Level Committee Report, "Tomorrow ITU: The Challenges of Change," Geneva, 1991, p. 12.

[131] Among its many functions, the CCITT has been responsible for paving the way for the world-wide transition from the current telephone network to single digital networks. It has defined ISDN as follows: "The main feature of the ISDN concept is the support of a wide range of voice and non-voice applications in the same network. A key element of service integration for an ISDN is the provision of a range of services using a limited set of connection types and multipurpose user network interface arrangements." (*Telecommunications in Europe*, Ungerer, p. 49).

7.0 IMPACT OF GENERAL AGREEMENT ON TARIFFS AND TRADE DISCUSSIONS ON CONVERGENCE

Within the GATT Uruguay Round, efforts are being made to ensure the development of competitive and efficient telecommunications services on a world-wide basis. The GATT encourages transparency of regulation and competition while discouraging anti-competitive behaviour by monopolies. The Telecommunications Annex of the General Agreement on Trade in Services (GATS) deals exclusively with enhanced and basic services and does not make specific provision for the convergence of broadcasting and telecommunications. The text, however, establishes guidelines that would permit the introduction of new services or allow technologies to converge.

The GATT Agreement does not specifically discuss areas of cross ownership between the broadcast sector and telecommunications. In terms of ownership in general, the Agreement provides for each country to progressively eliminate specific regulatory barriers that restrict foreign access to its telecommunication market.